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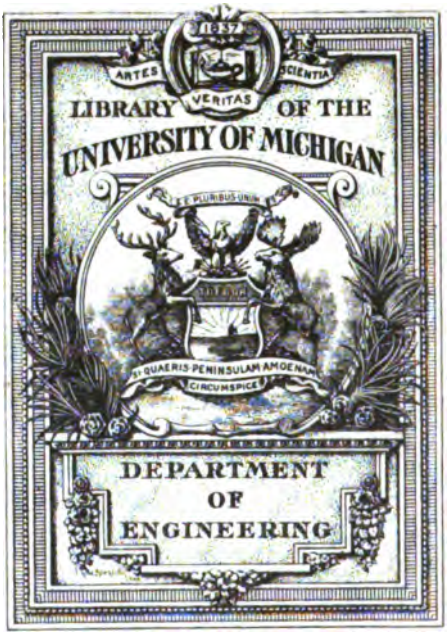

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ANNUAL REPORT

OF THE

WATER SUPPLY COMMISSION

OF

PENNSYLVANIA

1914.

HARRISBURG, PA.:
WM. STANLEY RAY, STATE PRINTER
1915

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LETTER OF TRANSMITTAL.

Office of the Water Supply Commission,

Harrisburg, December 31st, 1914.

To His Excellency, the Governor of the Commonwealth of Pennsylvania:

To the Members of the Senate and the House of Representatives of the Commonwealth of Pennsylvania:

In compliance with the provisions of the Act of the General Assembly, approved May 4th, 1905, the Water Supply Commission of Pennsylvania respectfully submits its report for the year 1914.

JOHN BIRKINBINE,
Chairman.

BENJAMIN K. FOCHT,
Vice-Chairman.

THOMAS J. LYNCH,
Secretary.

ROBERT S. CONKLIN,
Commissioner of Forestry.

SAMUEL G. DIXON,
Commissioner of Health.

REPORT

OF THE

WATER SUPPLY COMMISSION OF PENNSYLVANIA

1914.

CHAPTER I.

INTRODUCTION AND RECOMMENDATIONS.

The activities of the Water Supply Commission during the year 1914 may be briefly classified as:

1. INCORPORATION OF WATER AND WATER POWER COMPANIES.

Four water companies were incorporated, one consolidation was effected among such companies, and no water power charters were granted during 1914. The small number of applications for water companies is probably due to the fact that communities are generally supplied and few not so served have developed the requisite population to warrant incorporation and installation of water supply systems.

2. SUPERVISION OF THE DESIGN AND CONSTRUCTION OF DAMS AND INVESTIGATION OF THE STABILITY OF EXISTING DAMS.

The Commission passed upon the plans and specifications and issued permits for the construction of 46 dams and for the repair or modification of 22 such structures during 1914. Construction work has been carefully supervised, in order to secure adherence to the approved plans and to insure stability. A detailed and systematic examination is being made of existing dams and repairs or modifications ordered to unsafe structures. There are approximately 400 important dams in this State, and on December 31st, 1914, 293 had been examined, of which 57 were found deficient in some detail.

3. PERMITS TO MAKE ENCROACHMENTS IN STREAMS.

More applications for encroachments were received during 1914 than during the previous six and one-half years after the passage of the Encroachment Act of 1907. This increase resulted from the operation of the Act of June 25th, 1913, which covers all streams,

and because builders of proposed bridges, walls, fills and other forms of water obstructions are becoming familiar with its provisions. In 1914 five hundred and sixty-one permits were issued, while previous to that year the total number of permits issued was two hundred and sixty-four. Approved encroachments under construction have been inspected periodically and reconnoissance trips made to enforce the provisions of the law. The Commission invites information concerning proposed encroachments and dams and will consider and investigate all protests with regard to their safety or possible injurious effects upon stream channels.

4. CONTINUATION AND EXTENSION OF THE STREAM GAGING AND FLOOD WARNING SERVICES.

Twenty stream gaging stations and three stations for flood warning purposes were established during 1914, making 107 gaging stations from which the Commission receives reports, of which 12 are operated by the United States Geological Survey in neighboring states, on streams bordering or entering Pennsylvania, and 95 by the Commission. On account of the reasons set forth in Chapter 7 of this report, it was found advisable to change the "water year" in the compilation of hydrographic data, and end it on September 30th, so that this information published in this report extends from January 1st to September 30th, 1914. The flood warning service has proven its value by timely and accurate warnings and will be continued and extended. During the winter and spring stream flow was about 20 per cent. above normal, while during the summer and early fall it fell to 50 per cent. of normal for that season. Wilkes-Barre experienced damage by a flood in March and Scranton by a cloudburst on Roaring Brook in July.

5. INVENTORY OF THE PRESENT CONDITION AND UTILIZATION OF THE WATER RESOURCES AND PREPARATION OF A SPECIAL REPORT.

The Inventory Report, made in accordance with the provisions of the Act of July 25th, 1913, sets forth the present condition and utilization of Pennsylvania streams and contains gazetteers of all named streams and of lakes and ponds, with detailed descriptions of the more important ones. Descriptions are given of the operating water supply systems and information presented concerning the more important industrial supplies, together with the status of all water and water power companies. Records of rainfall at 212 points and its distribution over the State; records of floods at 15 points on Pennsylvania rivers and a discussion of the causes of floods and flood damage; descriptions of all operating hydro-electric plants and of the water power situation; the effect of the discharge of anthracite culm into streams and a method of relief from such prac-

tice; a study of flood conditions in Turtle Creek and a method of improving them; a discussion of past and present navigation, construction of canals and improvement of rivers for this purpose.

6. PYMATUNING RESERVOIR PROJECT.

The hydrographic studies in connection with the Pymatuning Reservoir Project have been continued and extended, dam sites explored and the cost of a dam estimated while 281 properties necessary to acquire have been surveyed.

7. CONSTRUCTION OF TWO DYKES, WITH REGULATING GATES, ALONG THE DELAWARE RIVER, NEAR BRISTOL, BUCKS COUNTY.

The Legislatures of 1911 and 1913 made appropriation for the construction of protective dykes along the Delaware River, at the mouths of two small streams, in Bucks county near Bristol, for the purpose of preventing floods and high tides from inundating agricultural land. This work has been completed.

8. INVESTIGATION AND REPORT UPON A METHOD OF IMPROVING SANDY CREEK, IN CRAWFORD COUNTY.

The Legislature of 1913 appropriated $10,000.00 for the purpose of making an investigation of the present utilization and best development of Sandy Creek, with particular reference to improvement of flood conditions in Sandy Lake borough and surrounding territory. The investigation indicated that the cost of the proposed work would be in excess of the appropriation.

Descriptions of the work accomplished under the above headings are given in succeeding chapters of this report, with the exception of the results of the Water Resources Inventory and the Pymatuning Reservoir Project, which are treated in special reports.

RECOMMENDATIONS.

In order to facilitate the work of the Commission and to permit of greater benefit to the streams, it is recommended that the Water Supply Commission be directed to determine and lay out, on plans and on the ground, lines along river and stream banks, through congested districts, beyond which no encroachments will be permitted. A law should provide power to cause the removal of such obstructions as may extend beyond the encroachment lines at the time they are established, if such obstructions are a menace to life and property in times of floods.

CHAPTER II.

WATER SUPPLY AND WATER POWER COMPANIES.

WATER SUPPLY COMPANIES:

The Commission has approved, during 1914, four applications for incorporation of water supply companies, one agreement of merger and two consolidations by purchase of property and franchises. The agreement of merger and one consolidation by purchase, however, did not receive approval of other State Departments in time to become effective this year. Table No. 1 presents the number of water supply companies incorporated with the approval of the Commission each year since its creation and the present status thereof.

TABLE NO. 1.

Number of Water Supply Companies Incorporated Each Year From May 4, 1905, to December 31, 1914, and Their Present Status.

Year.	Number incorporated.	In Operation.		Absorbed by Companies in Operation.		Under Construction.		Not Operating.	
		Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.
1905,	4	3	75	1	25	0	.....	0	.....
1906,	27	15	56	4	15	0	.....	8	29
1907,	31	17	55	4	13	0	.....	10	32
1908,	18	10	56	1	5	0	.....	7	39
1909,	30	19	63	7	23	2	7	2	7
1910,	25	19	76	3	12	1	4	2	8
1911,	25	17	68	3	12	1	4	4	16
1912,	15	12	80	1	7	0	.....	2	13
1913,	16	13	81	0	.....	1	6	2	12
1914,	4	1	25	1	25	1	25	1	25
Total and equivalent per cent.,	195	126	65	25	13	6	3	38	19

In previous reports those companies which have been sold to or merged with companies in operation were included under the column "Not Operating," but in this table they have been separated under the column, "Absorbed by Companies in Operation."

Fewer companies were formed during 1914 than in any year since 1880. Tables Nos. 2, 3 and 4 show respectively the water companies incorporated, the source of supply and character of works of the operating companies, and the consolidation effected among water supply companies during 1914.

TABLE NO. 2.

Water Supply Companies Incorporated in 1914.

Number.	Name.	Date of Incorporation.	Territory Covered by Charter.	Status.
1	Bethlehem City Water Company (new).	June 13, 1914,	Salisbury township, Lehigh county.	Active. Name changed Oct. 26, 1914, from Bethlehem Water Company.
2	Hanover Water Co. of Lehigh County.	June 13, 1914,	Hanover township, Lehigh county.	Sold to Bethlehem City Water Co. (new).
3	Jamestown Water Co., ..	Jan. 9, 1914,	Jamestown borough, Mercer county.	Works under construction.
4	Lower Saucon Township Water Co.	Nov. 25, 1914,	Lower Saucon township, Lehigh county.	Active.

TABLE NO. 3.

Water Supply Companies Incorporated in 1914 Which Are in Operation.

Name.	Supplies.	Source of Supply.	System of Supply.
Bethlehem City Water Co. (New).*	Bethlehem Township, Northampton county, Salisbury, Hanover and Lower Saucon townships, Lehigh county.	Lehigh river,.	Pumping.

*Absorbed Hanover Water Company of Lehigh County.

TABLE NO. 4.

Consolidation of Water Supply Companies Effected During the Year 1914.

Holding Company.		Constituent Companies.			
Name.	Incorporated for	Name and Date of Incorporation.	Incorporated for	Form of Consolidation.	Date of Consolidation.
Bethlehem City Water Co. (new). Name changed from Bethlehem Water Co.	Salisbury Twp., Lehigh county, June 13, 1914.	Bethlehem City Water Co., Sept. 10, 1903. Hanover Water Co. of Lehigh Co., June 13, 1914.	Bethlehem Twp., Northampton county. Hanover Twp., Lehigh Co.,	Sale of property and franchises.	Oct. 22, 1914.

The incorporation of the Bethlehem Water Company for Salisbury Township, Lehigh county, was followed by the purchase by that company of two other companies, and a change of name to the Bethlehem City Water Company.

WATER POWER COMPANIES:

Since the organization of the Commission in 1905, 52 water power companies have been incorporated, of which 15 are operating, 9 having been merged into two consolidations, which took over plants built under previous charters, and two charters cover a single development. Under these charters, therefore, there are six developments, two of which were constructed prior to the formation of these corporations. One company is building its works and three have been dissolved. The remaining 33 are not in operation; of these, 22 are merged into three consolidations. The 33 charters represent 11 proposed developments, upon which construction work has not yet begun.

CHAPTER III.

DAMS.

The Water Supply Commission of Pennsylvania, under the duties imposed upon it by the act entitled:

> "An act providing for the regulation of dams, or other structures or obstructions, as defined herein, in, along, across, or projecting into all streams and bodies of water wholly or partly within, or forming part of the boundary of, this Commonwealth; vesting certain powers and duties in the Water Supply Commission of Pennsylvania, for this purpose; and providing penalties for the violation of the provisions hereof,"

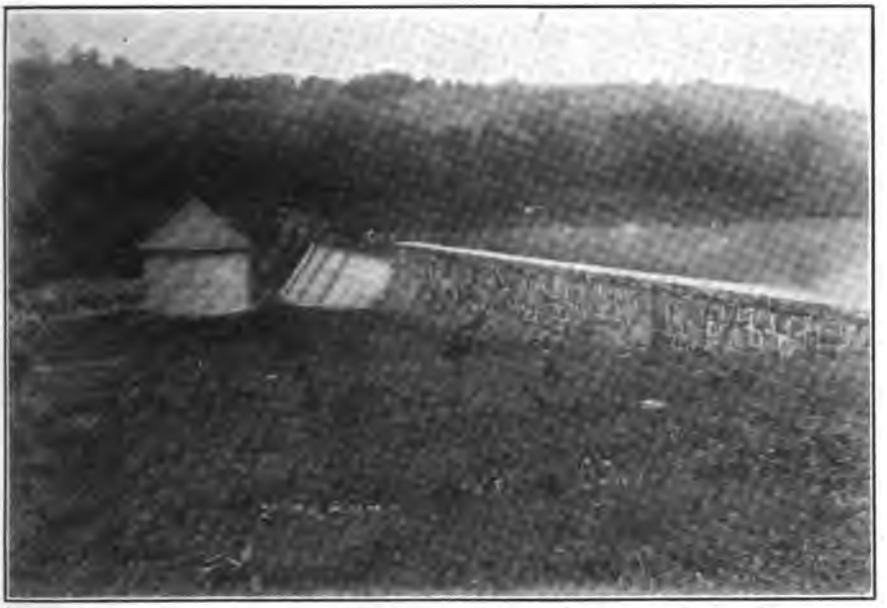
approved June 25, 1913, has made physical examination of dam sites, analyzed and passed upon plans and specifications for proposed dams, and supervised their construction, in order to insure their construction in accordance with permits issued and conditions imposed by the Commission. A systematic examination of all existing dams has been commenced and will continue until every dam of importance in the Commonwealth has been examined.

Permits have been issued for the construction of 77 new dams, and for the modification, repair or strengthening of 28 others, while 284 examinations were made in supervising construction under these permits.

There are approximately 400 dams in Pennsylvania, whose location, height or storage is such that failure might result in loss of life or damage to property. Of these, 293, or three-fourths, have been examined, and about one in five found deficient and ordered repaired. There are many dams of less importance whose failure might add somewhat to the height of flood water, although it is improbable that serious damage could be attributed directly to them. Attention has been confined thus far to the more important structures, with the ultimate expectation of examining dams of every description.

MAINTENANCE.

Existing dams, which have been examined and found safe, or upon which repairs have been ordered to remedy defects, and new dams. which have been built under the supervision of the Commission, will continue in a condition of stability only if properly maintained, since all dams are subject to deterioration. The Commission cannot too strongly emphasize the necessity for making periodic examinations of dams, in order that proper maintenance may be assured.



Mountain Water Supply Company. Dam on Indian Creek.

Silver Creek Water Company. Lower Tumbling Run Dam.

DAM DESIGN.

In passing upon plans and specifications for dams, the Commission has given stability first consideration, although recognizing that economy is an important element in the design. The two are in fact interdependent, for strength to a degree beyond that necessary to insure stability is not good engineering, while economy without safety is criminal. It is to assist the average practicing engineer that the Commission insists upon a close adherence to established standards of dam design in applications for construction which come before it, since the consulting experts apply to their work the mature judgment which experience and study has developed.

Proper factors of safety should be applied to all elements entering into the construction of a dam. The safety factor in an engineering design is an acknowledgement that uncertainties and contingencies are involved, which lie beyond the scope of human intelligence to estimate accurately and which must be provided for in a more or less arbitrary manner. These uncertainties enter into the design of dams, as into nearly all hydraulic construction, and this fact has not always received adequate recognition. Further, the elements of commercialism may influence, to a certain extent, the values of safety factors.

The Water Supply Commission, by insisting upon high standards of design, will, to a large extent, relieve the average practicing engineer from the harmful influence of commercialism, and permit him to apply his best judgment, to the end that the construction of all dams in the State will be of a higher grade than has heretofore in all cases obtained.

PROVINCE OF COMMISSION.

The plans and specifications submitted in connection with an application for a dam must be sufficiently complete to permit of intelligent consideration and meet the requirements of approved engineering practice in regard to stability. If they do not provide for a safe structure, the applicant is requested to overcome the deficiency. The Commission cannot undertake to do engineering work for applicants, and matters pertaining to adaptability of design or economy in construction do not lie within its province. The plans and specifications are scrutinized and the site examined for the purpose of determining the degree of safety of the proposed structure.

Table No. 5 indicates the work done each year since the Commission has exercised jurisdiction over dams; following which will be found tables and summaries of the work accomplished during 1914.

TABLE NO. 5.

Number of Permits Issued for the Construction and Repair of Dams, Progress Examinations During Construction and Examinations of Existing Dams.

	1911	1912	1913	1914	Total.
Permits for new dams,	4	8	19	46	77
Permits for modifications or repairs of existing dams,	0	1	5	22	28
Progress examinations during construction,	0	28	70	136	234
Examinations of existing dams,	5	23	33	232	293

APPLICATIONS FOR NEW DAMS.

During 1914, 62 applications were considered by the Commission for the construction of new dams. Data concerning these structures and the action taken on the applications are shown in Table No. 6.

TABLE NO. 6.

New Dams. Applications During 1914.

	Name of Owner and Dam.	Location. Stream and County.	Drainage area above dam. Sq. miles.	Data on Dam. Type.	Length in feet.	Height in feet.	Reservoir. Area in acres.	Capacity in million gallons.	Action.	
1	Altoona, city of,	Sugar Run—Blair,	6.4	Timber,	40	5	.....	.....	Approved.	1
2	American Zinc & Chemical Co.,	Br. of Burgetts Br. of Raccoon Creek—Washington.	1.0	Earth embankment with reinforced concrete core.	470	23	7.0	30.0	Approved.	2
3	American Zinc & Chemical Co.,	Burgetts Branch of Raccoon Creek—Washington.	9.1	Rock fill,	25	1	.....	.....	Approved.	3
4	Ammon, Elijah S. Creek,	Allegheny Creek—Berks,	16.5	Earth embankment with masonry core.	190	12	.....	6.3	Disapproved.	4
5	Beaver Fish & Game Association,	Bieber Run—Berks,	3.3	Earth and stone with concrete core.	220	8	.....	.....	Approved.	5
6	Blair Gap Water Supply Co.,	Bells Gap Run—Blair,	.....	Concrete containing steel Cipoletti weir.	.....	2.8	.....	.....	Approved.	6
7	Blake, A. O.,	Jennings Brook—Wayne,	.....	Concrete,	.....	.....	.....	.....	Awaiting plans.	7
8	Boland, William P.,	S. Br. Roaring Cr.—Lackawanna.	1.2	Arch reinforced concrete,	350	21	25.0	40.0	Awaiting plans.	8
9	Brady Brothers,	Trout Creek—Monroe,	10.0	Earth embankment with concrete spillway.	1,600	18	.....	.....	Approved.	9
10	Buck Hill Water Co.,	Buck Hill Stream—Monroe,	5.5 to 6.0	Rubble masonry,	125	5	.....	.....	Approved.	10
11	Cairnbrook Water Co.,	Beaver Run—Somerset,	.....	Earth embankment with concrete core.	72	8	.....	0.5	Action postponed by applicant.	11
12	Canawacta Water Supply Co.,	Drinker's Creek — Susquehanna.	1.3	Concrete,	88	18	26.0	50.0	Approved.	12
13	Cherry, C. G.,	Conneaut Creek—Erie,	150.0	Earth embankment with concrete spillway.	266	14	.....	.....	Awaiting plans.	13
14	Citizens Water Co. of McDonald,	West Branch of St. Patrick Run—Washington.	1.35	Earth embankment with masonry core.	565	58	38.0	250.0	Approved.	14
15	Citizens Water Co. of Scottdale,	Greenlick Run—Fayette,	.....	Concrete with steel Cipoletti weir.	.....	2.75	.....	.....	Approved.	15

TABLE NO. 6—Continued.

Name of Owner and Dam.	Location. Stream and County.	Drainage area above dam. Sq. miles.	Data on Dam. Type.	Length in feet.	Height in feet.	Reservoir. Area in acres.	Capacity in million gallons.	Action.	
16 Clymer Water Co. of Indiana, ...	Two Lick Creek—Indiana,..	78.0	Reinforced concrete, ...	213	10	.....	4 to 5	Approved.	16
17 Coatesville, borough of, ...	Rock Run—Chester, ...	5.32	Hollow reinforced concrete with earth embankment.	583	56	61.0	332.0	Approved.	17
18 Conemaugh & Franklin Water Co. No. 2.	Clapboard Run—Cambria, ..	2.5	Earth embankment with puddle core.	400	48	4.8	50.0	Approved.	18
19 Consolidated Water Supply Co., ..	Lackawanna River—Susquehanna and Wayne.	40.0	Ogee concrete gravity, ...	119.5	6	.....	.....	Approved.	19
20 Derr, Cyrus G., ...	Angelica Creek—Berks, ...	2.54	Timber crib with earth embankment.	91	6	.....	0.5	Approved.	20
21 Diamond Water Co., ...	Barnes Run—Luzerne, ...	1.2	Rock and earth fill, ...	30	3	0.4	Small,	.....	21
22 Drocton Land Co., ...	Paddy Run—Clinton, ...	.....	Rock filled cribs, ...	.....	.....	.....	.....	.....	22
23 East Stroudsburg borough, ...	Sambo Creek—Monroe, ...	2.0	Earth and rock fill with masonry core.	477	16.5	9.3	27.0	Approved.	23
24 Garis, W. W., & L. B. Rowe, Lake Rustic.	Buts Creek—Monroe, ...	1 to 2	Masonry and rock fill, ...	487	32	40.6	95.0	Action withheld.	24
25 Girard Water Co., ...	Whiskey Mill Cr.—Schuylkill.	1.8	Clay embankment, ...	20	4	.....	.....	Approved.	25
26 Guinan, D. F., P. J. Campion and Leon L. Eckert.	Hossensack Creek—Schuylkill.	.....	Earth embankment, ...	.....	.....	.....	.....	Awaiting plans.	26
27 Hazelhurst Water Co., ...	Sherman Run—McKean, ...	1 to 2	Rubble masonry, ...	80	7	.....	0.1	Approved.	27
28 Hazelton Water Co. (Wyoming Valley Water Supply Co., lessee).	Barnes Run—Luzerne, ...	1.0	Earth embankment, ...	62	5.5	0.12	0.125	.....	28
29 Hazelton Water Co. (Wyoming Valley Water Supply Co., lessee). Dam "F."	Dreck Creek—Luzerne, ...	2.1	Earth embankment with concrete core.	820	80	64.0	192.0	Approved.	29
30 Hazelton Water Co. (Wyoming Valley Water Supply Co., lessee). Dam "G."	Dreck Creek—Luzerne, ...	2.46	Earth embankment with concrete core.	500	22	13.0	45.0	Approved.	30
31 High Ridge Water Supply Co., ...	Tub Mill Creek—Westmoreland.	.....	Concrete with steel Cipoletti weir.	.....	2.75	.....	.....	Approved.	31
32 Hillside Water Supply Co., Gravity Water Co., Pure Mountain Water Co.	Town Line or Laurel Run—Somerset.	4.0	Timber crib, ...	40	10	.....	0.1	Approved.	32

33 Kennett Square borough, ...	Tributary of Red Clay Creek—Chester.	0.4	Earth embankment with concrete and clay cores.	.....	11	.....	2.0	Approved.	33
34 Lake Geneva Park Co., ...	Headwaters Lehigh River—Wayne.	1.5	Concrete with earth embankment.	700	10	133.0	.....	Approved.	34
35 Lehigh Valley R. R. Co., ...	Beaver Run—Carbon, ...	2.24	Earth embankment with concrete core.	230	20	.....	5.0	Approved.	35
36 Lehigh Valley R. R. Co., facing mill.	Mahoning Creek—Carbon, ..	36.3	Earth with concrete spillway, ..	300	11	.....	40.0	Approved.	36
37 Ligonier Lumber Co., ...	Mill Creek—Westmoreland,	14.5	Timber, ...	40	4	.....	.....	Awaiting plans.	37
38 Mansfield Water Co., ...	Taylor Run—Tioga, ...	1.12	Earth embankment with concrete core.	160	33	4.0	11.0	Approved.	38
39 Mar Lin Water Co., ...	Raccoon Creek—Schuylkill,	1.0	Earth embankment with puddle core.	290	17	.....	4.0	Approved.	39
40 Mohnsville Water Co., ...	Kleinginna Creek—Berks, ..	1.4	Earth and rock embankment with concrete core.	185	12	1.6	3.0	Approved.	40
41 Mt. Jewett Water Co., ...	Head Brook—McKean, ...	0.5	Masonry, ...	133	12	.....	0.2	Approved.	41
42 Panther Valley Water Co., ...	Bear Creek—Carbon, ...	1.1	Hollow reinforced concrete, ...	420	64	.....	80.0	Approved.	42
43 Pennsylvania State Hospital for Tuberculosis.	Mill Creek—Berks, ...	2.0	Hollow reinforced concrete and gravity section.	145	5	.....	0.25	Approved.	43
44 Raub, Samuel, Estate, Lake Raub,	Harvey's Creek—Luzerne, ..	13.7	Earth and rock embankment with concrete core.	425	18	18.0	.....	Approved.	44
45 Reading Suburban Water Co., ...	Frush Valley Stream—Berks.	0.2	Masonry spillway and earth embankment.	220	9	0.25	0.225	Action postponed by applicant.	45
46 Richland, borough of, ...	Small Run of South Mountain—Lebanon.	0.38	Earth with reinforced concrete core.	100	13	0.1	0.25	.....	46
47 Ring, J. A., ...	Willoughby Run—Adams, ..	5.0	Concrete gravity section, ...	275	12	4.5	7.0	Approved.	47
48 Rutt, Edgar S., John R. Ebersole and J. N. Olweiler.	North Branch Conoy Creek—Lancaster.	3.0	Concrete gravity and reinforced concrete.	100	7	0.8	0.3	Awaiting plans.	48
49 Schwab, E. E., ...	Trib. Chester Creek—Cambria.	.....	Concrete and stone masonry, ...	145	17	.....	.....	Approved.	49
50 Shippensburg, borough of, ...	Furnace Run—Franklin, ...	2.3	Concrete and earth embankment,	234	14	0.5	0.4	Approved.	50
51 Shippensburg, borough of,*	Furnace Run—Franklin, ...	2.3	Concrete and earth embankment,	.....	24	.....	7.0	Approved.	51
52 Shippensburg Gas & Electric Co., Roxbury.	Conodoguinet Creek—Franklin.	33.7	Earth embankment, concrete walls and spillway.	3,800	10	.....	16.0	Approved.	52
53 Shohola Falls Hydro-Elec. Co., ...	Shohola Creek—Pike, ...	60.0	Hollow reinforced concrete, earth embankment with concrete core.	1,200	38	1,720.0	36,181.75	Under adv.	53
54 Shupp, Simon, & Co., ...	Pohopco Creek—Monroe, ...	14.0	Earth embankment, ...	450	6	.....	.....	Approved.	54
55 Springdale, borough of, ...	Boreland Run—Allegheny,..	0.15	Earth embankment with reinforced concrete core.	200	36	1.45	6 to 7.0	Approved.	55
56 Stroudsburg Water Supply Co., ...	Flagler Run—Monroe, ...	4.7	Concrete weir, ...	30	2.0	.....	.....	Approved.	56
57 State-Centre Electric Co., ...	Spring Creek—Centre, ...	145 to 150	Concrete with earth embankment.	323	7.5	.....	.....	Approved.	57
58 Summit Water Supply Co., ...	Bear Rock Run—Cambria,	3.0	Rock fill, ...	50	5	.....	Nominal.	Approved.	58
59 Summit Water Supply Co., ...	Beaver Run—Cambria, ...	7.5	Rock fill, ...	70	5	.....	0.1	Approved.	59
60 Tipton Water Co., ...	Tipton Run—Blair, ...	.....	Concrete with steel Cipoletti weir.	.....	2.75	.....	.....	Approved.	60
61 Towanda Water Works, ...	Saterlee Run or West Branch of Towanda Creek—Bradford.	3.9	Masonry and earth with concrete core.	.....	40	.....	29.0	Awaiting action Health Dept.	61
62 Weatherly Water Co., ...	Penrose Creek—Carbon, ...	1.4	Earth embankment with concrete spillway.	61	10	0.25	0.5	Approved.	62

*Application for change in plans.

To summarize Table No. 6—forty-six aplications were approved and permits issued, one was disapproved, two held under advisement, six were held pending the receipt of plans, two delayed at the request of the applicants, and five were received too late for action this year. The plans submitted for the construction of these dams represented many types. Nearly 50 per cent. were earthen dams, while about 25 per cent. were masonry spillways with end embankments. Below is shown the number of each type:

Earth embankment,	5
Earth embankment with concrete core,	7
Earth embankment with reinforced concrete core,	3
Earth embankment with puddle core,	2
Earth embankment with masonry core,	5
Combination earth embankment and masonry,	13
Masonry (Gravity),	2
Concrete (Gravity),	9
Reinforced concrete,	2
Reinforced concrete (hollow),	4
Rock filled cribs with earth embankment,	1
Rock filled cribs,	2
Arched reinforced concrete,	1
Timber,	2
Rock fill,	3

Three of the hollow reinforced concrete dams and one of the earthen dams will exceed 50 feet in height.

APPLICATIONS FOR REPAIRS AND MODIFICATIONS.

In addition to the applications for permission to construct new dams, 31 applications were received for repairs or modifications, about one-half being ordered by the Commission. Of these, 22 were approved, one was held under advisement, three were held pending the receipt of plans and five, which were received late in the year, are awaiting action. Descriptions of these dams will be found in Table No. 10, while Table No. 7 indicates the nature of the repairs for which application was made.

Lehighton Water Supply Company.
No. 1 Dam on Long Run Undergoing Repairs.

TABLE NO. 7.

Repairs and Modifications. Applications During 1914.

	Name of Owner and Dam.	Location, Stream and County.	Drainage area above dam, sq. miles.	Type of Dam.	Capacity of reservoir in million gals.	Repairs and Modifications.	Action.	
1	Albert, Elmer,	Big Meadows Creek—Monroe,	1.7	Concrete with earth embankment upstream,	.....	Reconstruction,	Approved,	1
2	Ashland, Borough of, No. 1 Reservoir,	Little Mahanoy Creek—Schuylkill,	.....	Earth embankment,	4.0	Increased reservoir and riprap upstream slope.	Approved,	2
3	Ashton, Dr. Thomas G.,	Tributary Ridley Creek—Chester,	2.0	Masonry with earth backing,	1.0	Reinforced concrete cut-off wall,	Approved,	3
4	Bear Gap Water Co., No. 1,	Roaring Creek—Columbia,	14.2	.....	.....	New spillway,	.....	4
5	Blair Gap Water Supply Co.,	Bell's Gap Run—Blair,	14.0	Earth embankment with clay puddle core,	65.0	Grouting foundation to decrease leakage,	Approved,	5
6	Clearfield Water Co.,	Montgomery Cr.—Clearfield	9.5 to 10	Earth embankment with puddle core,	62.0	Repairs to decrease leakage and prevent erosion of spillway channel,	Approved,	6
7	Columbia & Montour Electric Co., Irondale,	Fishing Creek—Columbia,	280.0	Rock filled cribs with earth embankment,	.....	Flashboards,	Approved,	7
8	Cowanshannock Coal & Coke Co. No. 3,	Branch of Cowanshannock Creek—Armstrong,	1.4	Earth embankment,	2.0	Reconstruction,	Awaiting plans	8
9	Forged Steel Wheel Co.,	Connoquenessing Creek—Butler,	80.0	Masonry overfall,	.....	Increased spillway,	Approved,	9
10	Garrett Water Co.,	Piney Run—Somerset,	0.75	Arched masonry with earth fill upstream,	1 or 2	Increased height,	Under adv.,	10
11	Jefferson R. R. Co.,	Tributary West Branch Lackawanna River—Susquehanna,	6.3	Dry masonry with earth embankment,	65.0	Increased spillway,	Approved,	11
12	Jefferson R. R. Co.,	Tributary West Branch Lackawanna River—Susquehanna,	1.8	Dry masonry with earth embankment,	30.0	Increased spillway,	Approved,	12
13	Lackawanna & Wyoming Valley R. R. Co., Cooling Pond,	Roaring Brook—Lackawanna	57.0	Masonry,	Nominal	Flashboards,	Approved,	13
14	Lehighton Water Supply Co., No. 1,	Long Run—Carbon,	2.7	Masonry and concrete with earth embankment,	20.0	Repairs to decrease leakage,	Approved,	14
15	Maryd Coal Co.,	Swift Creek—Schuylkill,	.....	Earth embankment with puddle core,	.....	Enlarged embankment,	.....	15
16	Miller, Kimball S.,	Hagerman Run—Lycoming,	10.0	Earth embankment, masonry spillway,	.....	Increased spillway,	Awaiting plans	16

TABLE NO. 7.—Continued.

	Name of Owner and Dam.	Location, Streaman d County.	Drainage area above dam, sq. miles.	Type of Dam.	Capacity of reservoir in million gals.	Repairs and Modifications.	Action.	
17	New Brighton Water Co., Fallston,	Beaver River—Beaver, ...	.....	Timber cribs, ...	.....	Repairing breach, ...	Approved, ...	17
18	Northumberland Co. Gas & El. Co.,	Middle Creek—Snyder, ...	159.0	Timber horse with earth embankment, ...	.....	Repairs and stengthening, ...	Approved, ...	18
19	Raystown Water & Power Co., ...	Raystown Branch Juniata River—Huntingdon, ...	995.0	.....	.....	Flashboards, ...	Approved, ...	19
20	Reading, City of, ...	Antietam or Stony Creek—Berks, ...	5.44	Arched masonry with earth embankment upstream, ...	101.0	Increased spillway and decrease leakage, ...	Approved, ...	20
21	Roaring Creek Water Co., No. 5, ..	Roaring Creek—Columbia,	9.45	.....	6.2	New Concrete spillway, ...		21
22	Scranton Gas & Water Co., No. 7,	Roaring Brook — Lackawanna, ...	50.0	Masonry gravity section, ...	101.4	Blow-off pipe, ...	Approved, ...	22
23	Scranton Gas & Water Co., Curtis or Oak Run, ...	Oak Run—Lackawanna, ...	2.4	Masonry and earth embankment with rubble core, ..	418.3	Repairs and strengthening, ...	Approved, ...	23
24	Shenandoah Borough Water Co., ..	Davis Run—Schuylkill, ...	.....	Earth embankment, ...	.....	Spillway repairs, ...		24
25	Slipp, John W., ...	Six Penny Creek—Merks, .	3.2	Earth embankment, ...	2.0	Repairing breach, ...	Approved, ...	25
26	Smethport Water Co., ...	Blacksmith Brook—McKean,	2 to 3	Rubble masonry gravity section, ...	1.6	Strengthening, ...	Approved, ...	26
27	South Fork Water Co., No. 1,.....	Sandy Run—Cambria, ...	6.9	Earth embankment with puddle core, ...	11.0	Spillway repairs, ...		27
28	Susquehanna County Electric Co., Pages Pond, ...	Salt Lick Creek—Susquehanna, ...	3.28	Dry stone, with upstream embankment, ...	.....	Spillway repairs, ...	Approved, ...	28
29	Swarts, Ezra N., ...	Tributary to Roaring Brook —Lackawanna, ...	0.55	Concrete, ...	Small	Repairing breach, ...	Awaiting plans	29
30	Uniontown Water Co., No. 3, Hutchinson, ...	Redstone Creek—Fayette,	2.0	Masonry with upstream embankment, ...	85.0	Increased spillway, ...	Approved, ...	30
31	Uniontown Water Co., No. 2, Cool Spring, ...	Shutes Run—Fayette, ...	2.0	Earth embankment with puddle core, ...	25.0	Concrete lining in reservoir, ...	Approved, ...	31

CONSTRUCTION CONTINUED UNDER OLD PERMITS.

A few of the new dams for which permits were issued prior to 1914 were still under construction this year and it was necessary to keep the work under observation. Descriptions of these dams are given in Table No. 8.

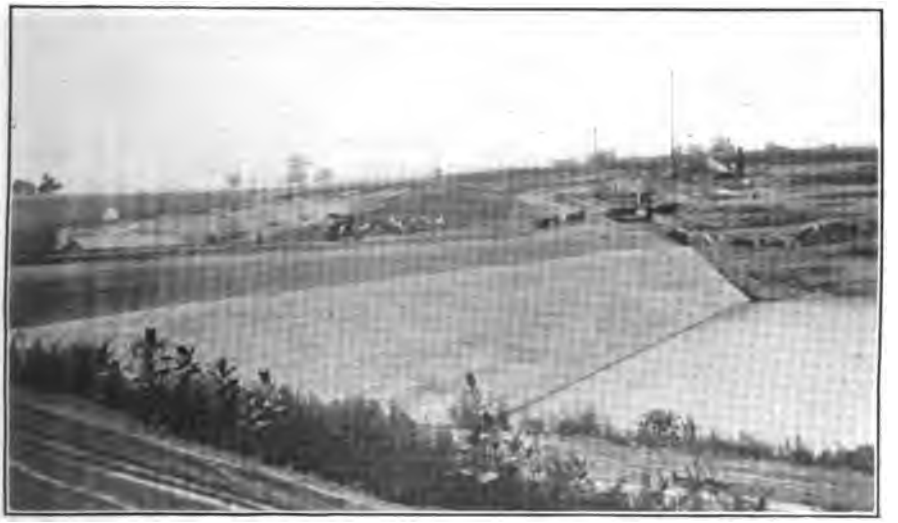
REPAIRS AND MODIFICATIONS CONTINUED DURING 1914.

Construction was also continued during 1914 upon the repair and modification of four dams for which permits had been issued prior to 1914. These dams are described in Table No. 9.

TABLE NO. 8.

New Dams. Permits Issued Prior to, and Construction Continued During 1914.

Name of Owner and Dam.	Location—Stream and County.	Drainage area above dam—square miles.	Data on Dam.			Reservoir.		Action.
			Type.	Length in feet.	Height in feet.	Area in acres.	Capacity in million gallons.	
1. Citizens Water Co.,	Cold Stream—Centre,	4.0	Earth embankment with concrete core and spillway,	207	13	.....	0.75	Approved, 1
2. Columbia and Montour Electric Co., Irondale,	Fishing Creek—Columbia,	280.0	Rock filled cribs with earth embankments,	1,335	15	.....	.....	Approved, 2
3. Colver Water Co.,	Vettera Branch of Black Lick Creek—Cambria,	5.3	Earth embankment with concrete core,	535	18	.....	20.0	Approved, 3
4. Forged Steel Wheel Co.,	Connoquenessing Creek—Butler,	80.0	Masonry overfall,	155	10	.....	.....	Approved, 4
5. Girard Water Co.,	Dresher's Run—Schuylkill,	0.95	Earth embankment with concrete core,	700	63	.....	264.0	Approved, 5
6. Graves, E. A.,	Conneaut Creek—Crawford,	43.0	Concrete gravity section and earth embankment,	800	14	.....	.....	Approved, 6
7. Harrisburg, City of,	Susquehanna River—Dauphin and Cumberland,	24109.0	Reinforced concrete,	.....	.....	.....	.....	Approved, 7
8. Mercersburg Water Co.,	Buck Run—Franklin,	2.87	Earth embankment with concrete core,	210	24	2.5	6.0	Approved, 8
9. Panther Valley Water Co.—Hauto,	Nesquehoning Creek—Carbon,	8.0	Earth embankment with puddle and concrete core,	1,600	31	250.0	1002.0	Approved, 9
10. Pennsylvania Training School,	Morgansa Creek—Washington,	2.2	Earth embankment with concrete core,	305	24	.....	30.0	Approved, 10
11. Pittsburgh, Harmony, Butler and New Castle Railway Co.,	Connoquenessing Creek—Butler,	225.0	Concrete gravity section,	165	8.5	.....	2.0	Approved, 11



Girard Water Company. Dreshers Run Dam under Construction.

TABLE NO. 9.

Repairs and Modifications. Permits Issued Prior to, and Construction Continued During, 1914.

Name of Owner and Dam.	Location—Stream and County.	Drainage area above dam—square miles.	Data on Dam.			Reservoir.		Action.	
			Type.	Length in feet.	Height in feet.	Area in acres.	Capacity in million gallons.		
1. Greenville Water Co.,	Tributary of Little Shenango River—Mercer,	2.2	Earth embankment with concrete spillway,	120	18	.....	13.0	Approved,	1
2. Mahanoy City Water Co.—Lofty,	Messers Run—Schuylkill,	1.7	Earth embankment,	1,100	28	.....	90.0	Approved,	2
3. Moore, F. N.,	Lake-of-Meadows—Bradford,	1.0	Dry masonry walls containing earth and rock fill,	85	17	50.0	.....	Approved,	3
4. Mount Penn Suburban Water Co.—No. 3,	Tributary of Antietam Creek—Berks,	0.25	Earth and rock embankment with concrete core,	320	18	1.9	.....	Approved,	4

PROGRESS EXAMINATIONS.

One hundred eighty-seven progress examinations were made, notes and photographs taken, to secure a record of progress and methods pursued in the construction of new dams and repairs to old ones.

EXISTING DAMS.

In accordance with the provisions of the Dam and Encroachment Act, the Commission has, upon its own initiative, been engaged in examining existing dams. This work was commenced in 1912 by executive order, subsequent to the failure of the Austin Dam, and 23 dams were examined in that year. In 1913, 33 examinations were made, mostly upon complaint, and the owners were directed to make repairs to 18 dams. During 1914 the work was prosecuted with an increased force and 232 dams were examined, of which 41 were ordered repaired. Table No. 10 is a list of the dams examined during 1914, which shows their dimensions, the size of the tributary watersheds and the areas and capacities of the reservoirs.

TABLE NO. 10.

Existing Dams Examined During 1914.

Name of Owner and Dam.	Location—Stream and County	Drainage area above dam—Sq. miles.	Data on Dam.			Reservoir.	
			Type.	Length in feet.	Height in feet.	Area in acres.	Capacity in million gallons.
1. Albert, Elmer,	Big Meadow Creek, Monroe,	1.7	Earth embankment with concrete core,	233	10	6.0	.....
2. Altoona, City of, Lake Altoona,	Burgoons Run, Blair,	11.2	Earth embankment with concrete core,	2,200	64	70.0	600.0
3. Altoona, City of, Kittanning Reservoir,	Burgoons Run, Blair,	.....	Earth embankment,	600	45	12.0	65.0
4. Altoona, City of, Impounding Reservoir,	Burgoons Run, Blair,	.....	Earth embankment,	1,000	60	42.0	365.0
5. Ammon, Elijah S.,	Allegheny Creek, Berks,	16.5	Dry stone wall with earth embankment upstream.	200	7	5.0	5.0
6. Anthracite Water Co.,	Mud Run, Schuylkill,	0.67	Earth embankment with concrete core,	1,124	33	53.6	202.7
7. Anthracite Water Co., Supply,	Waste House Run, Schuylkill,	.....	Earth embankment,	.....	.....	.....	.....
8. Anthracite Water Co., No. 1,	Waste House Run, Schuylkill,	0.9	Earth embankment,	400	51	10.2	60.8
9. Anthracite Water Co., No. 3,	Waste House Run, Schuylkill,	0.98	Earth embankment with puddle core,	1,060	36	14.4	44.6
10. Apollo Water Work Co.,	Tributary of Beaver Run, Armstrong.	0.4	Earth embankment with concrete core,	300	19	.....	10.0
11. Ashland, Borough of, No. 1,	Little Mahanoy Creek, Schuylkill,	.....	Dry wall with earth embankment,	.....	.....	.....	4.0
12. Ashton, Dr. Thomas G.,	Tributary of Ridley Creek, Chester,	2.0	Dry masonry wall with earth embankment, both faces.	164	14	.....	1.0
13. Berwind, White Coal Co., No. 2,	Little Paint Creek, Cambria,	10.3	Earth embankment,	260	8	1.25	1.5
14. Birdsboro Water Co.,	Indian Run, Berks,	0.8	Earth embankment,	370	40	.....	12.0
15. Blair Gap Water Supply Co.,	Blair Gap Run, Blair,	2.96	Masonry gravity section,	265	53	4.8	30.0
16. Blair Gap Water Supply Co., Brush Mountain.	Kettle Creek, Blair,	2.9	Earth embankment with concrete and clay puddle cut-off upstream.	860	54	21.0	188.0
17. Blair Gap Water Supply Co.,	Bell's Gap Run, Blair,	14.0	Earth embankment with clay puddle core.	780	24	18.7	65.0
18. Blair Gap Water Supply Co., Plane Nine.	Blair Gap Run, Blair,	12.5	Earth embankment with concrete cut-off.	950	48	20.4	110.0
19. Blair Gap Water Supply Co., Pottsgrove.	Kettle Creek, Blair,	3.5	Earth embankment,	720	36	8.0	85.0
20. Brier Hill Coke Co., No. 6,	Fourmile Run, Fayette,	0.3	Earth embankment with retaining wall downstream.	350	22	3.5	12.0

TABLE NO. 10.—Continued.

Name of Owner and Dam.	Location—Stream and County	Drainage area above dam—Sq. miles.	Data on Dam.			Reservoir.	
			Type.	Length in feet.	Height in feet.	Area in acres.	Capacity in million gallons.
21. Brown & Cochran, Nellie,	Br. of Dickerson Run, Fayette,	0.3	Earth embankment,	680	33	6.3	20.0
22. Cattell, Donald, Rowena Lake,	Br. of Roaring Run, Cambria,	4.5	Stone filled cribs with earth embankment upstream.	480	8	8.0	2.0
23. Citizens Water Co., No. 3,	Br. of Chartiers Cr., Washington,	1.4	Earth embankment,	640	36	34.0	106.0
24. Citizens Water Co., No. 4,	Point Lookout Branch, Washington,	2.3	Earth embankment with puddle cut-off trench.	900	45	76.0	600.0
25. Citizens Water Co. of McDonald,	St. Patrick Run, Washington,	4.64	Earth embankment with masonry core.	239	35	20.0	85.0
26. Citizens Water Co. of Scottdale,	Green Lick Run, Fayette,	3.4	Earth embankment with masonry core,	850	61	25.4	168.5
27. Clearfield Water Co.,	Moose Creek, Clearfield,	.....	Earth embankment with concrete core.	.....	.....	.....	.....
28. Clearfield Water Co.,	Montgomery Creek, Clearfield,	10.0	Earth embankment with clay puddle,	470	36	16.0	52.0
29. Clearview Water Supply Co.,	Licking Creek, Juniata,	15.9	Earth embankment with concrete cut-off.	740	24	30.0	56.0
30. Columbia & Montour Electric Co., Irondale.	Fishing Creek, Columbia,	280.0	Rock filled cribs with earth embankment.	1,335	15	.....	.....
31. Conemaugh & Franklin Water Co., No. 1.	Clapboard Run, Cambria,	3.56	Earth embankment with concrete core.	125	26.5	0.5	1.4
32. Connellsville Water Co.,	Breakneck Run, Fayette,	5.2	Earth embankment with concrete core.	250	28	5.0	15.0
33. Connellsville Water Co.,	McCoy Run, Fayette,	1.9	Earth embankment,	200	16	1.0	5.0
34. Consolidated Water Supply Co., Brownell (Scranton Gas & Water Co., Lessee.)	Racket Brook, Lackawanna,	3.63	Masonry and earth with masonry core,	613	60	126.0	846.9
35. Consolidated Water Supply Co., Edgerton.	Aylesworth Creek, Lackawanna,	2.9	Earth embankment with masonry core,	356	20	2.5	4.2
36. Consolidated Water Supply Co.,	Rush Brook, Lackawanna,	4.9	Masonry gravity,	209	15	2.3	6.0
37. Consolidated Water Supply Co., Chapman Lake.	S. Br. Tunkhannock Cr., Lackawanna.	0.5	Earth embankment with concrete core.	81	5	98.9	304.0

38. Consolidated Water Supply Co., Crystal Lake.	Fall Brook, Lackawanna,	0.9	Earth embankment with masonry core.	86	5	191.2	437.0
39. Consolidated Water Supply Co.,	Fall Brook, Lackawanna,	11.2	Rock filled cribs,	105	10	2.2	3.9
40 Consolidated Water Supply Co., Stillwater.	Lackawanna River, Susquehanna,	33.0	Rock filled cribs,	100	20	164.0	325.0
41. Consolidated Water Supply Co.,	Brace Brook, Wayne,	1.9	Masonry gravity,	154	13	3.0	3.0
42. Consolidated Water Supply Co., Vandling.	Roy Brook, Wayne,	0.8	Earth embankment with timber sheating.	48	6	0.1	0.1
43. Consolidated Water Supply Co.,	Panther Creek, Lackawanna,	1.3	Earth and rock embankment,	120	10	0.2	0.2
44. Consolidated Water Supply Co., No. 7,	Racket Brook, Wayne,	0.6	Earth embankment,	250	11	15.6	31.0
45. Consolidated Water Supply Co., No. 4,	Racket Brook, Lackawanna,	2.3	Earth embankment with masonry facing.	508	28	62.0	264.0
46. Cowanshannock Coal & Coke Co., No. 1,	Br. of Cowanshannock Cr., Armstrong.	1.5	Reinforced concrete,	226	16	4.0	7.5
47. Cowanshannock Coal & Coke Co., No. 2,	Br. of Cowanshnnock Cr., Armstrong.	1.5	Earth embankment,	195	12	2.0	2.0
48. Cowanshannock Coal & Coke Co., No. 3,	Br. of Cowanshannock Cr., Armstrong.	1.4	Earth embankment,	190	10	2.0	2.0
49. Cowanshannock Coal & Coke Co.,	Cowanshannock Creek, Armstrong,	26.8	Earth embankment with concrete core,	423	12	5.5	9.5
50. Cresson Ice Co., of Altoona,	Clearfield Creek, Cambria,	8.0	Earth embankment,	563	20	11.5	34.0
51. Cummings Water Co.,	Getty Run, Indiana,	2.0	Concrete gravity section,	455	29	.....	38.0
52. Dunbar Water Supply Co., No. 1, (Dunbar Furnace Co.)	Dunbar Creek, Fayette,	22.4	Concrete wall with earth fill upstream and rock fill downstream.	278	14	4.0	7.0
53. Dunbar Water Supply Co., No. 2, (Dunbar Furnace Co.)	Dunbar Creek, Fayette,	21.1	Concrete wall with earth fill upstream and rock fill downstream.	308	14	9.0	9.0
54. Dunbar Water Supply Co., No. 3, (Dunbar Furnace Co.)	Dunbar Creek, Fayette,	21.0	Concrete wall with earth fill upstream and rock fill downstream.	330	12	3.8	5.5
55. Dunbar Water Supply Co., No. 4, (Dunbar Furnace Co.)	Dunbar Creek, Fayette,	21.0	Concrete wall with earth fill upstream and rock fill downstream.	400	10	3.9	4.5
56. East McKeesport Water Co.,	Br. of Turtle Cr., Allegheny,	0.17	Concrete wall with earth embankment downstream.	151	40	3.0	10.0
57. Ebensburg Water Works, Pumping Station.	Branch of South Fork of Black Lick Creek, Cambria.	0.61	Earth embankment,	140	5	1.0	1.0
58. Echard Coal & Coke Co.,	Br. of Washington Run, Fayette,	0.6	Earth embankment,	210	20	1 to 2	6.0
59. Eckenrode & Miller,	Clearfield Creek, Cambria,	.....	.....	.....	.....	.....	.....
60. Flanders, Mrs. E. F.,	Cowanesque River, Tioga,	.....	Timber cribs,	.....	.....	.....	.....
61. Forged Steel Wheel Co., (H. C. Frick Coke Co., Lessee).	Connoquenessing Creek, Butler,	80.0	Masonry overfall,	155	10	.....	.....
62. Franklin Township Water Co., Colonial No. 1.	Allen Run, Fayette,	3.2	Earth embankment with clay puddle core.	250	25	12.0	30.0
63. Frick, H. C., Coke Co., Colonial No. 3,	Washwater Run, Fayette,	1.4	Concrete gravity section,	165	28	1.5	7.5
64. Frick, H. C., Coke Co., Colonial No. 4,	Colvin Run, Fayette,	2.8	Concrete gravity section,	205	31	2.5	10.2
65. Frick, H. C., Coke Co., Juniata or Butte Run.	Br. of Butte Run, Fayette,	1.0	Earth embankment,	435	16	8.0	26.0
66. Frick, H. C., Coke Co., Marguerite, (Standard Water Co., Subsidiary.)	Branch of Sewickley Creek, Westmoreland.	1.9	Earth embankment with puddle core,	300	16	13.1	25.1
67. Frick, H. C., Coke Co., Whitney-Ridge,	Armel Hollow Run, Westmoreland,	3.5	Earth embankment with masonry core,	508	30	6.6	23.0
68. Frick, H. C. Coke Co., Mammoth, (Sewickley Water Co. Subsidiary.)	Sewickley Creek, Westmoreland,	5.4	Earth embankment with concrete core for portion of length.	800	16	23.7	31.1
69. Garrett Water Co.,	Piney Run, Somerset,	0.75	Arched masonry with earth embankment upstream.	125	12	.....	2.0

TABLE NO. 10.—Continued.

Name of Owner and Dam.	Location—Stream and County	Drainage area above dam—Sq. miles.	Data on Dam.			Reservoir.	
			Type.	Length in feet.	Height in feet.	Area in acres.	Capacity in million gallons.
70. Glatfelter, I., Mill Dam,	S. Br. Codorus Creek, York,	11.3	Masonry,	76.5	4	0.6	0.6
71. Glatfelter, P. H., Co.,	W. Br. Codorus Creek, York,	67.0	Earth embankment,	950	10	10.0	11.0
72. Harris Boon Co. (Erie R. R. Co.),	Shohola Creek, Pike,	.....	Earth embankment,	700	8	1000.0	1000.0
73. Heathcote, S. E. & Co., Woolen Mill,	S. Br. Codorus Creek, York,	11.2	Dry masonry wall with clay backing,	152	8	2.6	4.0
74. Hess, Christopher, Mill,	Fishing Creek, York,	9.3	Rock filled cribs with earth embankment.	248	14	4.0	7.0
75. Hibbs Water Co.,	Br. of Salt Lick Cr., Fayette,	1.4	Earth embankment with clay core,	560	24	11.9	35.4
76. High Ridge Water Supply Co.,	Big Spring Run, Westmoreland,	1.16	Earth embankment with concrete and puddle cores.	1,000	43	6.7	42.0
77. High Ridge Water Supply Co., Storage,	Little Sugar Run, Westmoreland,	0.3	Earth embankment with concrete and puddle cores.	900	60	21.8	124.0
78. High Ridge Water Supply Co.,	Tub Mill Creek, Westmoreland,	10.66	Masonry gravity section,	1,100	40	41.0	200.0
79. Jefferson R. R. Co.,	Tributary West Branch Lackawanna River, Susquehanna.	6.3	Dry masonry with earth embankment,	150	15	250.0	65.0
80. Jefferson R. R. Co.,	Tributary West Branch Lackawanna River, Susquehanna.	1.8	Dry masonry with earth embankment,	120	16	420.0	30.0
81. Johnstown Water Co.,	Dalton Run, Somerset,	4.62	Earth embankment with puddle core,	670	61	18.0	130.0
82. Johnstown Water Co., No. 1,	Mill Creek, Cambria,	6.46	Earth embankment with puddle core,	300	26	9.0	32.0
83. Johnstown Water Co., No. 2,	Mill Creek, Cambria,	5.0	Earth embankment with puddle core,	515	45	14.6	97.0
84. Johnstown Water Co.,	Salt Lick Creek, Cambria,	11.5	Earth embankment with concrete core,	880	110	.....	857.0
85. Johnstown Water Co.,	St. Clair Run, Cambria,	4.85	Earth embankment with puddle core,	500	26.5	4.5	15.0
86. Koller Fertilizer Co., Seitsland,	S. Br. Codorus Creek, York,	11.1	Earth embankment with dry masonry slope wall.	260	9	3.0	1.7
87. Kunkel, Jacob B. & Son, Kunkels Mill,	Conewago Creek, York,	0.6	Rock filled cribs,	265	8	.....	.....
88. Lackawanna & Wyoming Valley R. R. Co., Cooling Pond.	Roaring Brook, Lackawanna,	57.0	Masonry gravity section,	160	25	.....	Variable.
89. Laflin Water Co. (Spring Brook Water Co.)	Gardner Creek, Luzerne,	2.15	Earth embankment with masonry core,	430	41	15.1	74. 0
90. Lake Ladore Improvement Co.,	Outlet of Elk Lake, Wayne,	0.80	Earth embankment with dry masonry slope wall.	200	11	168.0	.....

91. Lebanon City Water Works No. 1, ...	W. Br. Hammer Creek, Lebanon, ..	.....	Earth embankment, ...	.....	.....	.....	.....
92. Lebanon City Water Works, No. 2,.....	W. Br. Hammer Creek, Lebanon, ..	.....	Earth embankment with concrete core upper section.	.....	.....	.....	.....
93. Lebanon City Water Works, No. 3, ...	W. Br. Hammer Creek, Lebanon, ..	.....	Earth embankment, ...	.....	.....	.....	.....
94. Lehighton Water Supply Co., No. 1,....	Long Run, Carbon, ...	2.7	Masonry and concrete walls with earth backing.	290	27	.....	20.0
95. Mahanoy City Water Co., Lofty, ...	Messers' Run, Schuylkill, ...	1.7	Earth embankment with clay puddle core.	1,100	28	.....	90.0
96. Mahanoy City Water Co., No. 1, ...	Cold Run, Schuylkill, ...	0.25	Earth embankment, ...	1,050	20	5.8	10.6
97. Mahanoy City Water Co., No. 2, ...	Cold Run, Schuylkill, ...	0.10	Earth embankment, ...	900	30	8.5	25.6
98. Mahanoy City Water Co., No. 3, ...	Cold Run, Schuylkill, ...	0.35	Earth embankment, ...	300	15	2.5	4.9
99. Mahanoy City Water Co., No. 4, ...	Pole Run, Schuylkill, ...	0.25	Earth embankment, ...	700	40	10.9	33.8
100. Mahanoy City Water Co., Negro Hollow Run (Blue Head.)	Negro Hollow Run & Messr's Run, Schuylkill.	7.7	Earth embankment, ...	1,000	20	20.6	25.0
101. Manufacturers Water Co., (Cambria Steel Co.)	Quemahoning Creek, Somerset, ...	92.0	Earth embankment wth concrete core,	1,200	100	1100.0	14500.0
102. Manufacturers Water Co., (Cambria Steel Co.)	Hinckston Run, Cambria, ...	10.8	Earth embankment wth clay and concrete cores.	876	84	104.0	1124.0
103. Menallen Water Co., ...	Fan Run, Fayette, ...	1.5	Earth embankment with puddle core,	380	33	5.0	30.0
104. Miller, Kimball S., ...	Hagerman Run, Lycoming, ...	10.0	Earth embankment, ...	400	20	4.0	.....
105. Minersville Water Co., No. 3, (or Sammys.)	Dyers Run, Schuylkill, ...	4.44	Dry masonry wall with earth embankment upstream.	225	24	1.5	18.0
106. Minersville Water Co., No. 4, ...	Dyers Run, Schuylkill, ...	3.82	Earth and rock embankment with concrete core.	650	37	5.0	75.0
107. Minersville Water Co., ...	Wagner Run, Schuylkill, ...	0.67	Earth and rock embankment wth concrete core.	150	15	0.8	1.0
108. Minersville Water Co., ...	Weeler or McGinnis Run, Schuylkill.	1.14	Earth embankment, ...	110	17	0.5	1.0
109. Morrellville & Cambria Boro. Water Co.,	Strayer Run, Cambria, ...	1.2	Earth embankment, ...	230	18	0.8	2.0
110. Mountain Ice Co., Pocono Lake, ...	Tobyhanna Creek, Monroe, ...	80.0	Rock filled cribs with timber cut-off,	263	25	1000.0	.....
111. Mountain Water Supply Co., ...	Indian Creek, Fayette, ...	109.6	Masonry gravity section, ...	515	40	.....	231.0
112. Mt. Holly Paper Co. (S. F. Kitsmiller),	Mountain Creek, Cumberland, ...	47.3	Earth embankment, ...	700	11	25.0	20.0
113. Moore, F. N., ...	Lake-of-Meadows, Bradford, ...	1.0	Masonry walls confining earth and stone fill.	85	17	50.0	.....
114. Neal, R. C., Upper, ...	Cove Run, Perry, ...	6.5	Dry masonry with earth embankment upstream.	134	22	10.0	95.0
115. Neal, R. C., Lower, ...	Cove Run, Perry, ...	6.5	Dry masonry with earth embankment upstream.	117	18	1.0	2.5
116. New Brighton Water Co., Fallston, ...	Beaver River, Beaver, ...	.....	Timber cribs concrete covered, ...	427.5	8.5	.....	.....
117. New Salem Water Co., Lower, ...	Br. of Salt Lick Run, Fayette,....	0.3	Earth embankment with puddle core,	480	39	12.0	60.0
118. New Salem Water Co., Upper, ...	Br. of Salt Lick Run, Fayette, ...	0.2	Earth embankment, ...	290	35	3.0	20.0
119. Northern Cambria Water Co., ...	Brown's Run, Cambria, ...	0.6	Earth embankment with concrete cut-off.	300	38	4.5	16.5
120. Northern Cambria Water Co., Miller, ..	Stony Creek, Cambria, ...	2.68	Earth embankment with puddle core,	290	22	1.7	5.0
121. Northumberland Co., Gas & Elec. Co.,..	Middle Creek, Snyder, ...	159.0	Timber and earth embankment, ...	493	21.8	.....	.....
122. Olyphant Water Co., No. 1, ... (Scranton Gas & Water Co., Lessee.)	Grassy Island Creek, Lackawanna,..	3.5	Combination earth and masonry, ...	355	20	0.9	1.8
123. Olyphant Water Co., No. 2,..... (Scranton Gas & Water Co., Lessee.)	Grassy Island Creek, Lackawanna,..	2.3	Masonry gravity section, ...	337	48	8.2	57.6
124. Olyphant Water Co., No. 3, ... (Scranton Gas & Water Co., Lessee.)	Grassy Island Creek, Lackawanna,..	0.7	Earth embankment with puddle core,	750	25	10.4	39.6

TABLE NO. 10.—Continued.

Name of Owner and Dam.	Location—Stream and County	Drainage area above dam—Sq. miles.	Data on Dam.			Reservoir.	
			Type.	Length in feet.	Height in feet.	Area in acres.	Capacity in million gallons.
125. Olyphant Water Co., Laurel Run, ... (Scranton Gas & Water Co., Lessee.)	Grassy Island Creek, Lackawanna,..	1.4	Masonry gravity, ...	209	37	1.9	9.1
126. Olyphant Water Co., White Oak, ... (Scranton Gas & Water Co., Lessee.)	Grassy Island Creek, Lackawanna,..	1.8	Masonry gravity, ...	210	30	1.1	4.8
127. Orient Coke Co., ...	Br. of Dunlop Creek, Fayette, ...	0.2	Earth embankment with clay puddle core.	214	25	2.0	7.0
128. Orwigsburg Borough Municipal Water Supply, Lower.	Silfis Creek, Schuylkill, ...	0.32	Earthen, ...	350	20	3.0	20.0
129. Orwigsburg Borough Municipal Water Supply, Upper.	Silfis Creek, Schuylkill, ...	0.25	Dry stone wall and earth fill, ...	190	12	0.5	1.0
130. Paint Township Water Co., Bantley, ..	Big Paint Creek, Somerset, ...	10.0	Earth embankment, ...	340	20	4.0	15.0
131. Paint Township Water Co., Yost, ...	Big Paint Creek, Somerset, ...	10.0	Masonry wall with earth embankment upstream.	224	14	1.6	4.0
132. Palmer, W. S., Glenburn, ...	Dalton Run, Lackawanna, ...	8.75	Dry masonry with earth embankment downstream.	166	15	30.0	.....
133. Paradise Protectory, ...	S. E. Branch Beaver Cr., York, ...	.....	.....	.....	.....	.....	.....
134. Penn Central Light & Power Co., Warrior Ridge.	Frankstown Branch of Juniata River, Huntingdon.	837.0	Reinforced concrete, concrete power house and earth embankment.	1,130	28	160.0	.....
135. Pennsylvania Ice Co., of Altoona, Benjamin Anderson Mill.	Clearfield Creek, Cambria, ...	7.7	Earth embankment, ...	150	12	9.3	15.0
136. Pennsylvania Railroad Co., ...	Branch of South Branch of Black Lick Creek, Cambria.	0.5	Earth embankment, ...	50	8	.....	0.06
137. Perry Water Co. (B. & O. R. R.), ...	Stewarts Run, Fayette, ...	0.3	Earth embankment, ...	700	6	8.0	7.0
138. Plymouth Water Co., No. 1 (Spring Brook Water Supply Co. Lessee.)	Coal Creek, Luzerne, ...	1.44	Arch masonry, ...	67	16	0.1	0.2
139. Plymouth Water Co., No. 2, (Spring Brook Water Supply Co. Lessee.)	Coal Creek, Luzerne, ...	1.06	Arch masonry, ...	116	22	0.4	1.5
140. Plymouht Water Co., No. 3, (Spring Brook Water Supply Co. Lessee.)	Coal Creek, Luzerne, ...	0.92	Arch masonry, ...	144	21	0.6	3.0

141. Plymouth Water Co., No. 4, (Spring Brook Water Supply Co. Lessee.)	Coal Creek, Luzerne, ...	0.55	Masonry wall with earth embankment both sides.	331	17	2.2	6.0
142. Pocono Pines Ice Co., ...	Upper Tunkhannock Cr., Monroe, ..	28.0	Combination concrete earth and timber cribs.	1,600	12	500 to 600	.....
143. Portage Water Co., Martindale Storage,	Trout Run, Cambria, ...	0.9	Earth embankment with concrete core,	632	19	6.6	11.2
144. Puritan Water Co., Wolf Spring, ...	Indian Camp Run, Westmoreland, ..	1.9	Earth embankment with masonry core,	250	31	1.8	7.3
145. Rainey, W. J., Allison, ...	Br. of Dunlop Creek, Fayette, ...	0.64	Earth embankment with concrete core,	348	45	10.0	35.0
146. Rainey, W. J., Paul, ...	Br. of Dickerson Run, Fayette, ...	1.1	Earth embankment, ...	580	20	5.0	9.0
147. Rainey, W. J., Royal, ...	Row Run, Fayette, ...	1.6	Earth embankment, ...	460	28	8.0	26.7
148. Reading Water Dept., Egelman Reservoir.	Rose Valley Creek, Berks, ...	0.6	Earth embankment with masonry core,	700	15	2.5	7.0
149. Reading Water Dept., Egelman Settling Basin.	Rose Valley Creek, Berks, ...	0.6	Earth embankment with masonry core,	200	18	0.6	.....
150. Reading Water Dept., Stony Creek, ...	Stony or Antietam Cr., Berks, ...	5.44	Arched masonry with puddle wall upstream at toe of fill.	230	60	.....	101.0
151. Richland Township Water Co., Elton,..	Little Paint Creek, Cambria, ...	8.1	Rock filled cribs with earth embankment upstream.	610	20	2.5	8.0
152. Schuylkill Haven Gas & Water Co., Panther Valley.	Schuylkill, ...	.....	Earth embankment, ...	.....	.....	.....	.....
153. Scranton Gas & Water Co., Elmhurst,..	Roaring Brook, Lackawanna, ...	37.3	Masonry and earth with masonry core,	384	68	194.0	1,398.5
154. Scranton Gas & Water Co., Dunmore No. 1.	Little Roaring Brook, Lackawanna,	4.91	Masonry wall with earth embankment backing.	467	34	22.5	75.4
155. Scranton Gas & Water Co., Dunmore No. 3.	Little Roaring Brook, Lackawanna,	0.13	Earth embankment, ...	300	13	9.0	13.0
156. Scranton Gas & Water Co., Dunmore No. 4.	Little Roaring Brook, Lackawanna,	0.25	Earth embankment, ...	570	14	6.0	10.0
157. Scranton Gas & Water Co., No. 5, ...	Stafford Meadow Brook, Lackawanna.	11.5	Earth embankment with masonry core,	348	30	9.8	31.0
158. Scranton Gas & Water Co., No. 7,.....	Roaring Brook, Lackawanna, ...	50.0	Masonry gravity section, ...	339.5	45	18.8	101.4
159. Scranton Gas & Water Co., Gouldsboro,	Lehigh River, Lackawanna, ...	15.2	Concrete ogee and earth embankment at ends with concrete core.	319	7.5	63.5	80.3
160. Scranton Gas & Water Co., ...	Griffin Creek, Lackawanna, ...	3.21	Masonry and earth embankment, ...	375	40	109.7	548.8
161. Scranton Gas & Water Co., ...	Lake Henry Creek, Lackawanna,....	0.9	Earth embankment with concrete core,	1,763	7.5	69.4	204.9
162. Scranton Gas & Water Co., La Rue, ..	Summit Lake Creek, Lackawanna, ..	2.35	Concrete ogee; earth embankment with concrete core.	127	18	0.4	0.8
163. Scranton Gas & Water Co., Lake Scranton.	Stafford Meadow Brook, Lackawanna.	6.0	Two masonry gravity sections and esrth embankment with masonry core.	2,670 330	57 22.5	225.0	2,517.8
164. Scranton Gas & Water Co., Maple Lake,	Summit Lake Creek, Lackawanna,	6.0	Masonry and earth embankment, ...	160	17	2.4	3.7
165. Scranton Gas & Water Co., Curtis, ...	Oak Run, Lackawanna, ...	2.4	Masonry; earth embankment with rubble core.	363	34	75.1	418.3
166. Scranton Gas & Water Co., ...	Summit Lake Creek, Lackawanna,	0.95	Masonry and earth embankment, ...	200	24	57.0	259.4
167. Scranton Gas & Water Co., Williams Bridge.	Stafford Meadow Brook, Lackawanna.	5.0	Earth embankment with masonry core,	510	48	42.6	342.6
168. Shenandoah Borough Water Supply, ...	Davis Run, Schuylkill, ...	.....	Earth embankment, ...	.....	.....	.....	.....
169. Shenandoah Citizens Gas & Water Co., No. 1.	..... Schuylkill, ...	.....	Earth embankment, ...	.....	.....	.....	.....
170. Shenandoah Citizens Gas & Water Co., No. 2.	Kehley Run, Schuylkill, ...	.....	Earth embankment, ...	320	16	0.92	1.9
171. Shenandoah Citizens Gas & Water Co., No. 3.	Kehley Run, Schuylkill, ...	.....	Earth embankment, ...	435	32	2.38	12.5
172. Shenandoah Citizens Gas & Water Co., No. 4.	Kehley Run, Schuylkill, ...	.....	Earth embankment, ...	450	19	1.45	4.4

TABLE NO. 10.—Continued.

Name of Owner and Dam	Location—Stream and County	Drainage area above dam—Sq. miles.	Data on Dam.			Reservoir.	
			Type.	Length in feet.	Height in feet.	Area in acres.	Capacity in million gallons.
173. Shenandoah Citizens Gas & Water Co., No. 5.	Kehley Run, Schuylkill, ...	.....	Earth embankment, ...	990	24.5	6.5	17.6
174. Shenandoah Citizens Gas & Water Co., No. 6.	Kehley Run, Schuylkill, ...	.....	Earth embankment, ...	750	16	7.7	13.4
175. Silver Creek Water Co., Upper, No. 2,	Tumbling Run, Schuylkill, ...	6.5	Earth embankment, ...	570	60	30.0	224.0
176. Sine, L. D., Saw Mill Dam, ...	Beaver Run, Somerset, ...	.....	.....	.....	.....	.....	.....
177. Slipp, John W., ...	Six Penny Creek, Berks, ...	3.2	Earth embankment, ...	400	13	3.6	2.0
178. Smethport Water Co., ...	Blacksmith Brook, McKean, ...	2 to 3	Rubble masonry gravity section, ...	116	19	1.5	1.6
179. South Fork Water Co., No. 1, ...	Sandy Run, Cambria, ...	6.9	Earth embankment with puddle core,	245	17	2.6	11.0
180. South Fork Water Co., No. 2, ...	Sandy Run, Cambria, ...	5.6	Earth embankment with puddle core,	400	28	3.5	15.0
181. Spencer Coal Co., ...	Roaring Brook, Lackawanna, ...	56.0	Concrete wall, ...	75	10	.....	.....
182. Spring Brook Water Supply Co., Storage,	Falling Springs Creek, Luzerne, ...	1.25	Earth embankment with concrete core,	1,895	60	49.0	229.0
183. Spring Brook Water Supply Co., No. 1,	Laurel Run, Luzerne, ...	6.58	Masonry circular arch, ...	200	20	2.0	5.0
184. Spring Brook Water Supply Co., No. 2,	Laurel Run, Luzerne, ...	6.3	Masonry arch dam, ...	281	26	6.0	35.0
185. Spring Brook Water Supply Co., Intake No. 2.	Harvey's Creek, Luzerne, ...	35.0	Masonry gravity section, ...	220	13	3.0	4.0
186. Spring Brook Water Supply Co., ...	Covey Creek, Lackawanna, ...	0.7	Earth embankment, ...	450	20	10.0	14.0
187. Spring Brook Water Supply Co., Crystal Lake.	Wapwallopen Creek, Luzerne, ...	2.3	Masonry gravity section, ...	710	18	420.0	1650.0
188. Spring Brook Water Supply Co., Maple Lake.	Rattlesnake Creek,, Lackawanna, ..	1.1	Earth embankment, ...	450	15	35.0	300.0
189. Spring Brook Water Supply Co., Intake,	Mill Creek, Luzerne, ...	10.0	Masonry gravity section, ...	110	35	1.3	4.0
190. Spring Brook Water Supply Co., Newport Storage (Glenn Lyon.)	..... Luzerne, ...	.....	Masonry gravity section,.	600	20	5.5	19.3
191. Spring Brook Water Supply Co., No. 1,	Pine Run, Luzerne, ...	4.56	Masonry and concrete gravity sections,	268	33	2.0	7.5
192. Spring Brook Water Supply Co., Intake,	Spring Brook, Lackawanna, ...	44.4	Masonry gravity section, ...	245	18	116.0	25.5
193. Spring Brook Water Supply Co., Stark,	Covey Creek, Lackawanna, ...	0.4	Earth embankment with clay puddle,	200	20	4.0	10.0
194. Spring Brook Water Supply Co., Sugar Notch.	..... Luzerne, ...	.....	Earth embankment, ...	200	10	6.3	9.3

195. Spring Brook Water Supply Co., ...	Wanamie Run, Luzerne, ...	0.77	Earth embankment, ...	200	17	5.0	34.0
196. Spring Brook Water Supply Co., ...	Pike Creek, Luzerne, ...	11.7	Earth embankment with reinforced concrete core.	2,125	57	389.0	2941.0
197. Spring Brook Water Supply Co., Storage,	Mill Creek, Luzerne, ...	5.07	Earth embankment with masonry core,	1,292	69	100.0	616.0
198. Spring Brook Water Supply Co., ... (West Side Water Co.), Huntsville.	Toby Creek, Luzerne, ...	3.26	Arch masonry with earth embankment upstream.	247	27	377.0	1922.7
199 Spring Brook Water Supply Co., Deep Hollow.	Branch of Mill Creek, Luzerne, ...	1.51	Arch concrete, ...	863	40	45.0	241.4
200. Spring Water Supply Co., Nesbitt, ...	Spring Brook, Lackawanna, ...	37.08	Masonry gravity section and earth embankment with concrete core.	525	87	116.3	1279.2
201. Spring Brook Water Supply Co., Campbells Ledge Storage Reservoir.	Falling Springs Creek, Luzerne, ...	1.65	Earth embankment with concrete core,	1,325	30	21.7	69.7
202. Summit Water Supply Co., No. 1, ...	Bear Rock Run, Cambria, ...	1.6	Earth embankment with clay puddle core.	640	28	3.7	10.0
203. Summit Water Supply Co., No. 2, ...	Bear Rock Run, Cambria, ...	1.3	Earth embankment with clay puddle core.	320	36	7.5	30.0
204. Summit Water Supply Co., Lloydell, ..	South Fork of Little Conemaugh River, Cambria.	7.95	Masonry gravity section, ...	700	64	42.0	207.0
205. Summit Water Supply Co., Wilmore,...	N. Br. Conemaugh River, Cambria,	25.0	Concrete gravity section, ...	1,100	40	.....	1025.0
206. Susquehanna County Electric Co., Pages Pond.	Salt Lick Creek, Susquehanna, ...	3.28	Dry masonry wall with earth embankment upstream.	161	13	100.0	.....
207. Swartz, Ezra N., ...	Br. of Roaring Brook, Lackawanna,	0.55	Concrete wall, ...	110	8	.....	.....
208. Tamaqua Municipal Water Works, ...	Owl Creek, Schuylkill, ...	2.71	Dry rubble and concrete walls with earth embankment upstream.	450	21	11.0	18.0
209. Tamaqua Municipal Water Works, Intake.	Rabbit Run, Schuylkill, ...	1.0	Earth embankment with masonry core wall.	80	10	0.1	.....
210. Tamaqua Municipal Water Works, ...	Rabbit Run, Schuylkill, ...	1.61	Dry masonry with earth embankment upstream.	360	15	4.0	6.0
211. Taylor Coal & Coke Co., ...	Br. of Salt Lick Run, Fayette, ...	1.3	Earth embankment, ...	340	14	4.0	6.2
212. Taylor Coal & Coke Co., ...	Br. of Br. of Salt Lick Run, Fayette.	0.2	Earth embankment with concrete core.	500	38	8 to 10	42.0
213. Thomas Colliery Co., No. 1, ...	Kehley Run, Schuylkill, ...	.....	Earth embankment, ...	130	8	0.2	0.2
214. Trotter Water Co., Lemont, ...	Shutes Run, Fayette, ...	1.1	Earth embankment with puddle trench,	890	16	7.0	17.0
215. Trotter Water Co., Lower, ...	Coal Lick Run, Fayette, ...	1.6	Earth embankment with puddle trench,	365	16	5.0	11.0
216. Trotter Water Co., Brownfield, ...	Br. Redstone Cr., Fayette,.....	0.2	Earth embankment, ...	.....	10	0.7	10.0
217. Trotter Water Co., Upper, ...	Coal Lick Run, Fayette, ...	1.5	Earth embankment with clay puddle trench.	365	14	6.2	10.0
218. Tyrone Gas & Water Co., No. 1, ...	Sink Run, Blair, ...	6.0	Earth embankment with clay puddle trench.	620	36	11.0	60.0
219. Tyrone Gas & Water Co., No. 2, ...	Sink Run, Blair, ...	5.8	Earth embankment with clay puddle trench.	768	51	14.0	.....
220. Uniontown Water Co., ...	Bennington Run, Fayette, ...	1.3	Earth embankment with clay puddle core.	150	15	0.5	1.5
221. Uniontown Water Co., No. 1, ...	Cool Spring Run, Fayette, ...	3.0	Earth embankment with clay puddle core.	240	20	1.2	2.5
222. Uniontown Water Co., No. 2, Cool Spring.	Shutes Run, Fayette, ...	2.0	Earth embankment with clay puddle core.	475	42	4.0	25.0
223. Uniontown Water Co., No. 1, ...	Hutchinson Run, Fayette, ...	2.6	Earth embankment with clay puddle core.	300	25	3.2	12.0
324. Uniontown Water Co., No. 2, ...	Huntchinson Run, Fayette, ...	2.0	Earth embankment with concrete core wall.	520	36	9.0	37.0
225. Uniontown Water Co., No. 3, Hutchinson.	Redstone Creek, Fayette, ...	2.0	Masonry with earth embankment downstream.	500	53	16.0	85.0

TABLE NO. 10.—Continued.

Name of Owner and Dam.	Location—Stream and County.	Drainage area above dam—Sq. miles.	Data on Dam.			Reservoir.	
			Type.	Length in feet.	Height in feet.	Area in acres.	Capacity in million gallons.
226. Washington Coal & Coke Co., No. 1,....	Br. of Washington Run, Fayette,....	1.0	Earth embankment, ...	535	28	11.9	48.6
227. Washington Coal & Coke Co., No. 2, ...	Br. of Washington Run, Fayette,....	0.7	Earth embankment, ...	340	28	2 to 3	10.1
228. Washington Coal & Coke Co., ...	Crabapple Run, Fayette, ...	3.0	Earth embankment with clay puddle trench.	692	31	11.4	31.7
229. Washington Coal & Coke Co., Red Lion,	Br. of Little Redstone Cr., Fayette,	0.4	Earth embankment, ...	275	10	1.0	0.9
230 Westinghouse Elec. & Mfg. Co., ...	Fall Hollow Run, Allegheny, ...	2.3	Concrete gravity section, ...	95	15	0.85	1.5
231. Williams, Edwin (Rocky Glen Water Co.)	Dry Valley Creek, Lackawanna, ..	1.35	Masonry gravity section, ...	350	20	36.6	100.0
232. Winber Water & Power Co., ...	Clear Shade Creek, Somerset, ...	19.4	Masonry gravity section, ...	178	28	3.0	6.0

H. C. Frick Coke Company. Colonial No. 4 Dam on Redstone Creek.

Practically every known type of dam is represented in this list, as shown by the following tabulation:

Earth embankment (no core),	66
Earth embankment with concrete core,	33
Earth embankment with clay puddle core,	31
Earth embankment with masonry core,	14
Earth embankment with timber sheeting cut-off,	1
Masonry (gravity),	21
Concrete (gravity),	8
Reinforced concrete,	2
Combination earth fill and masonry,	31
Rock filled timber cribs,	12
Concrete (arched),	1
Masonry (arched),	8
Timber,	2

A majority of the dams are earthen, with or without core walls; most of them are low structures, only 21 of them exceeding 50 feet in height.

Deficiencies were found in a number of the dams and repairs or modifications were directed to be made to 41, three-quarters of these being deficient in spillway capacity. This is the most common cause of dam failures and care has been taken to eliminate it. Below is shown the nature and number of the repairs and modifications required:

General repairs and strengthening,	15
Increased spillway capacity,	29
Repairs to run-off channel,	4
Elimination of leakage,	3
Removal of trees,	1
Removal of dam or reconstruction,	3

DAM FAILURES.

In the report of the Water Supply Commission for 1912 is given a tabulation of dam failures in Pennsylvania, with descriptions of the dams and the manner in which the failures occurred. Data have been gathered on three additional failures and information concerning them is given below:

H. C. FRICK COKE COMPANY—COLONIAL NO. 4 DAM:

In 1906 a gravity section concrete dam was built for the Pittsburgh Coal Company in Colvin Run, near Grindstone, Fayette County, about 100 feet above the mouth of that stream in Redstone Creek. In 1910 the dam was sold to the H. C. Frick Coke Company. The reservoir has a capacity of 10,200,000 gallons, with a surface area of about 2.5 acres. The dam failed during a heavy rainstorm on July 21, 1912, and the upper 18 feet of the structure was carried away. It was reconstructed in the same year without change in the design.

The dam is 31.5 feet high and 21 feet wide at its maximum section, with a crest length of 205.6 feet. The top width is 2.5 feet and the

upstream face is vertical. The downstream face is vertical for 4.5 feet from the top, then slopes 2 on 1 for 23 feet and 1 on 1 for 4 feet, at which point it is stepped out 1 foot at the heel and 2 feet at the toe, and carried vertically to the foundation a distance of 12 feet below the natural ground surface.

The dam is founded on limestone rock which was grouted by means of 3″ drill holes 3 feet deep.

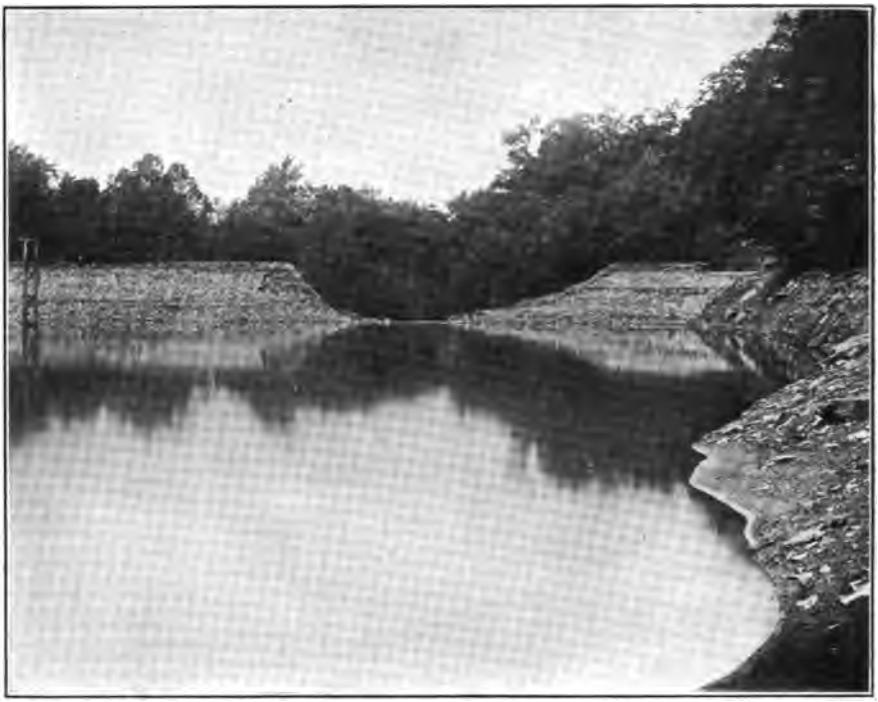
The concrete was mixed in the proportions of 1:3:4, with gravel for the aggregate, while derrick sized stones were embedded in the mass. Expanded metal of No. 8 gauge, 3″ mesh, in 6′ x 12′ sheets, was placed in the downstream face about one foot from the surface almost to the top of the dam.

The original spillway, 36 feet long and 2.5 feet deep, had a discharge capacity of approximately 500 cubic feet per second, or at the rate of 185 cubic feet per second per square mlie for the 2.7 square miles of tributary drainage area.

In July, 1912, the region about Uniontown was visited by heavy rains. The precipitation on July 17th was 0.51 inches, July 18th 1.18 inches, July 19th 1.22 inches, July 20th 0.00 inches, July 21st, 1.39 inches. On the last named day conditions were favorable for a high rate of runoff and water passed over the entire crest of the dam to a depth of one foot, which would indicate a discharge at the rate of 480 cubic feet per second per square mile, or a total of 1,300 cubic feet per second. During the height of the flood the dam failed. The concrete was boken off in layers to a level of 12 feet above the bed of the stream, at which elevation a flood had passed over the dam during construction. The failure was ascribed by the owners to neglect in cleaning the concrete along the horizontal joints left at the end of each days work and particularly at the joint over which the flood passed during construction.

An analysis of the structure, made with reference to the horizontal joint at which the dam failed, where the base width was 9.75 feet, and with the weight of the concrete taken at 140 pounds per cubic foot, gives the following results:

With the reservoir full, and without upward pressure, the resultant of forces fell 1.76 feet outside the "middle third," while the coefficient of friction was 0.80, and the pressures were 4,420 pounds per square foot compression at the toe, and 1,550 pounds tension at the heel. The manner in which the work was performed renders it probable that tension could not have been carried in the masonry, and that upward pressure would exist. With the reservoir full, and upward pressure assumed at $\frac{2}{3}$ the hydrastatic head at the heel, diminishing uniformly to zero at the toe, it was found that the resultant of forces fell 0.46 feet outside of the base, which is prabably a condition similar to that which resulted in failure of the dam.



Connellsville Water Company Dam on Breakneck Run. View showing failure of May 19, 1902.

CONNELLSVILLE WATER COMPANY—BREAKNECK DAM:

The Breakneck Dam, an earthen structure, was built across Breakneck Run, in Bullskin Township, Fayette County, in 1886, and 1887, by the Connellsville Water Company. In 1902 it was overtopped and a breach was washed through the embankment. Repairs were made and the dam put back into service when, in 1912, it was again overtopped and damaged, since which date it has not been in use. The drainage area tributary to the dam consisted of 5.2 square miles of precipitous country; the reservoir had a length of 725 feet and an average width of 310 feet, with a surface area of about 5.1 acres and a capacity of fifteen million gallons.

The dam was constructed of puddled earth containing may stones, across a valley whose light, sandy soil extends to a considerable depth below the surface. The spillway was at the north end of the embankment while a storm channel was provided around the south end by the construction of a dike, pierced at the head of the pool by two pipes to admit the normal flow of the stream. Two cast iron pipes, one for blow-off purposes and the other a supply main, penetrated the embankment, connecting with a concrete intake chamber within the pool.

The length of the dam was 207 feet, the crest width 8 feet and the maximum height above the stream channel 23 feet. The upstream face was paved with riprap and had a slope of 1 on 1.9; the downstream face, which was protected from surface scour by sod, had a slope of 1 on 1.7. A concrete core-wall, increasing in thickness from 21 inches at the top to 3 feet at the base, was constructed along the entire length at the upstream edge of the top of the embankment, extending into the shale hillsides and reaching rock foundation from 15 to 20 feet below the original surface.

The spillway was 30 feet in length, with its crest one foot below the top of the embankment; it was constructed of timber in the form of a channel, wtih a wooden flume to carry away waste water.

The storm channel was formed by constructing an embankment about 6 feet high along the south side and across the upper end of the pool, the natural slope of the hillside and the sodded bank of the dike, protected in places by stone walls, confining the waste water. At the dam a timber spillway discharged the flood flow into a paved channel which conducted it into the creek some distance below.

On May 19, 1902, a severe rain caused a flood and the storm channel became obstructed by debris. The dike, separating the upper end of the reservoir from the storm channel, was overtopped to a depth of 20 inches and a section near the north end, about 25 to 30 feet in length, was washed out. Water was admitted to the reservoir in quantities greater than could be discharged by the spillway and the

dam was overtopped to a depth of about 20 inches. The material on the downstream side of the core wall was washed away for a length of 75 to 100 feet and to a depth of 10 to 18 feet. The removal of this support caused the core wall to give way for a length of approximately 75 feet and a depth of about 12 feet and the upstream embankment was breached to the same length and depth. The spillway was undermined and destroyed. The flood discharge has been estimated at about 1,630 cubic feet per second, or 310 second feet per square mile of tributary drainage area.

Repairs and alterations were commenced shortly after the failure. A concrete core wall, extending to the top of the dam, was constructed upon that portion of the old one remaining in place and the embankments on each side of it were reconstructed of clay, spread in thin layers, wetted and tamped. The crest width of the entire structure was increased from 8 to 25 feet and the side slopes made the same as before the break. The spillway was reconstructed of concrete and the form changed from a channel to a flat crested weir. Its length was increased from 30 to 50 feet and the depth from 1 to 3 feet. A timber emergency spillway, 50 feet in length and 3 feet deep, was provided in the dike between the storm channel and the upper end of the pool. Dry stone walls were built at various points along the embankment of the storm channel, the spillway of which was reconstructed of masonry and timber. In the spring of 1907 a 16″ blow-off pipe, encased in concrete, was laid through the embankment.

A heavy rainfall occurred on August 19, 1912, while the storm channel was blocked off to permit of repairs being made to its spillway and the dam was overtopped to an average depth of 9 inches. The wooden flume at the lower end of the storm channel was partly destroyed and a portion of the embankment and core wall adjoining it was washed out, while the downstream portion of the embankment was slightly damaged at other points by erosion. The emergency spillway in the dike between the reservoir and the storm channel was practically destroyed by undermining of the plank floor. The flood discharge has been estimated at approximately 1,300 cubic feet per second or 250 second feet per square mile of drainage basin.

The core wall and embankment were repaired and a channel, 6′-3″ deep and 10′-6″ wide, was cut into the concrete spillway. The dam has not been in service since its last failure and the outlet pipes are kept open to prevent water from collecting behind it.

THE BUTLER WATER COMPANY—BOYDSTOWN DAM.

The Boydstown Dam, an earthen structure, was built across Connoquenessing Creek, in Oakland Township, Butler County, in 1896, by the Butler Water Company. The tributary drainage area consists

of 13.6 square miles of hilly country, about one-third of which is wooded and the balance farm land. The reservoir has a surface area of about 30 acres and a capacity of 73,673,000 gallons, which, with the use of 24″ flashboards, is increased to 94,350,000 gallons. In 1897 and in 1903, the dam was overtopped and the embankment breached on both occasions. It was repaired after each failure and is now in use.

The dam is reported to have been constructed of clay, deposited in layers and compacted by teaming, and to have contained along its center line a timber core wall set upon the rock bottom of a trench excavated for the entire length of the structure. The embankment is 310 feet long, has a top width of 10 feet and attains a maximum height above the stream bed of 28.4 feet. The 1 on 3 upstream slope is protetced by riprap while the 1 on 2 downstream slope is sodded.

The spilway was approximately 30 feet long and 7 feet deep, constructed near the center of the dam of planking upon rock filled timber cribs, the embankment being supported and protected by timber bulk-heads. Overflow was discharged into the creek channel some distance below the dam over a long sloping wooden apron protected from back wash and undercutting by timber sheeting.

A circular stone gate house was constructed near the upstream toe of the embankment to the right of the spillway, containing 3 intake openings at different elevations. A terra cotta pipe, controlled by a gate within the intake chamber, passed through the embankment to the west of the overfall section and conveyed the water to the pump house. This line was paralleled by a rectangular timber flume controlled by a gate intended to act as a drain and to supplement the spillway in time of flood.

No leakage was observed through the embankment subsequent to its completion in 1896 although seepage occurred through the shale at the west end. The terra cotta supply pipe, however, was broken by the weight of the material above it and replaced by a cast iron main during the winter of 1896-97.

On July 27, 1897, after a heavy rain, about 100 feet of the embankment, between the west hillside and the spillway, was washed out. The cause of the failure could not be definitely determined although the indications are that it resulted either from overtopping or from percolation along the recently completed cast iron pipe line, owing to the use of frozen earth in refilling the trench, insufficient compacting or leakage between sections of the pipe.

The breach was refilled with clay and the damaged timber cut-off replaced with a 24″ rubble masonry wall. The timber crib overfall near the center of the dam was removed and a wider spillway, of concrete and stone masonry, constructed at the east end with its

crest at the same elevation as the original wasteway. This was built in the form of a 40 to 50 foot channel resting upon the natural surface of the ground, paved on the bottom and sides with cement and stone. Recesses were provided at the spillway crest for the insertion of supports for 24 inch flashboards. The wasteway channel carried the water on a gradual slope into the original stream channel, about 200 feet below the toe of the embankment. A 16" supply main and a 30" blow-off were laid through the embankment to replace the original cast iron pipe.

On August 28, 1903, a precipitation of 8 inches in 4 hours and 15 minutes occurred on the watershed. The dam was overtopped to a depth of 12 inches and breached for a length of 130 feet between the portion formerly carried away and the spillway. The estimated discharge of the stream at the time of failure was 4,300 cubic feet per second or 315 second feet per square mile of tributary drainage area, although it is probable that this was exceeded at some time during the storm. It is reported that the spillway was obstructed by flashboards, 24 inches high.

CHAPTER IV.

ENCROACHMENTS.

The year 1914 has marked an advance in the regulation and control of encroachments in streams, 561 permits having been issued for the construction of bridges, fills, walls, piers and other encroachments, under the Act of June 25th, 1913, and they have been supervised so as not to be prejudicial to the flow of the stream or to adjoining property. Reasonable and fair enforcement of the Act has been the criterion for the purpose of maintaining and improving the regime of the streams without imposing unnecessary hardships upon applicants.

The report for 1913 contains a discussion of the Act of June 25th, 1913, which delegates to the Commission the duty of regulating the design and construction of bridges, fills, dykes, retaining and protection walls, wharves, cribbings, piling, ice-breakers, coal hoists, piers, jetties and any other form of encroachment, and gives the requirements concerning applications and the practice in their consideration

and disposition. This regulation has effected an improvement in the water courses and indiscriminate dumping and thoughtless obstruction have been checked. As individuals, municipalities and corporations appreciate the advantage and necessity of maintaining clean, sightly stream channels, capable of carrying greater floods without injury, stream improvement will result to a greater degree. Irrepairable damage has been done by the failure of the State to conserve and control its rivers and streams years ago.

Table No. 11, indicates, by years, the number of applications for encroachments approved by the Commission since 1908:

TABLE NO. 11.

Number of Encroachment Applications Approved, 1908 to 1914, Inclusive.

Year.	Bridges.	Fills.	Miscellaneous.	Total.
1908.	6	8	5	19
1909.	8	10	7	25
1910.	2	2	3	7
1911.	13	11	4	28
1912.	26	7	8	41
1913.	109	7	28	144
1914.	446	47	68	561

Although Table No. 11 shows a decided increase in the number of permits issued in the last two years, this is not due so much to increased construction as to the broader scope of the Act of 1913, which extended the Commission's supervision over all streams, provided a penalty and granted a larger appropriation to enforce its provisions.

INSPECTION OF BRIDGES.

In the consideration of applications for bridges attention has been confined to a study of the probable effect of the abutments, piers and superstructure upon the current and carrying capacity of the channel and the stability of the super or sub-structure has not been investigated. The Public Service Law of 1913 provides jurisdiction over the strength and stability of bridges which carry or cross public service lines of any character, and covers, therefore, many bridges, including those of railroad and trolley companies, but not all bridges. There probably are bridges in the Commonwealth which are not safe or which may become unsafe, and some are doubtless designed without a sufficient factor of safety.

The statutes provide, in the case of township, borough, city and county bridges, that the municipal authorities shall be responsible for the safety and strength thereof, and a means by which unsafe structures may be brought to the attention of such authorities. There is no such provision for local supervision over the designs and safety of dams, such authority being vested only in the Water Supply Commission. The Commission urges upon townships, boroughs, cities, counties and other owners the necessity for maintaining a strict and thorough supervision over the design and methods of construction used and also the necessity for systematic and thorough inspection of bridges after they have been put in use.

BARS AND ISLANDS.

In many streams bars or islands are constantly changing in location or size, causing reduction of the channel area and diversion of the water, with consequent erosion of the banks. Such bars are sometimes formed by ashes and refuse dumped into the streams above, but more often result from erosion of banks and channels of tributaries. Erosion of bars and islands is sometimes caused by artificial encroachments, which reduce the area, deflect the current and increase the velocity. A smooth, clean channel promotes greater discharge capacity and the Commission usually attaches a condition to permits, requiring a clear, unobstructed channel under, below and above bridges, at the completion of the work, and maintainence of the channel in such condition.

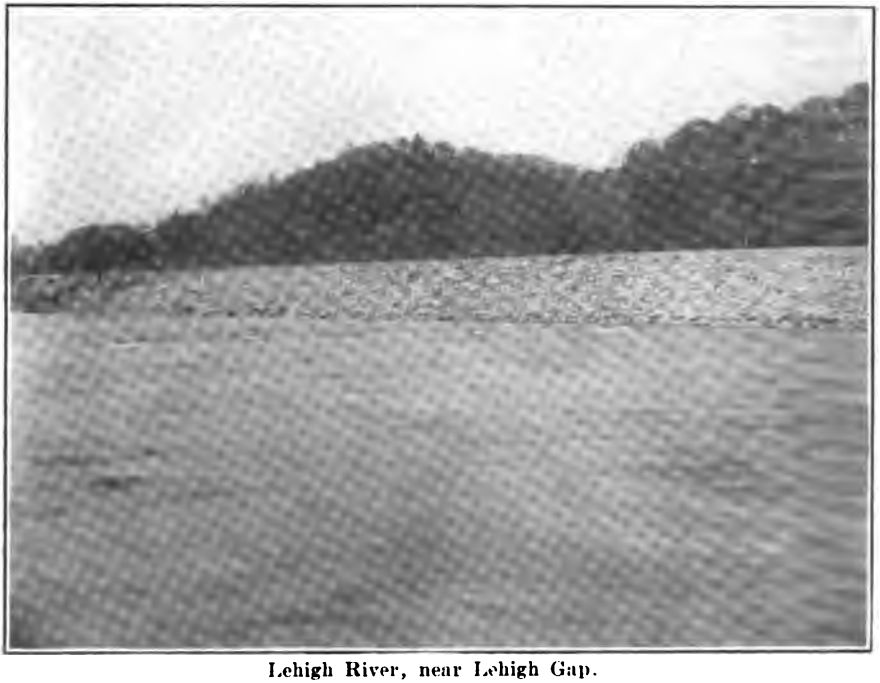
Many large cities and towns are situated in river valleys at the mouths of tributary streams, and their sewage, industrial wastes and other refuse is usually heedlessly dumped into the channels. Bars formed at the mouths of such tributaries are often responsible for increasing flood heights, diverting the current and causing bank erosion. Municipalities can aid the Commission in its work of improving channels and protect themselves from flood damage by prohibiting the dumping of refuse and wastes into streams, and by removing obstructing bars and debris. The sand and gravel so excavated can often be disposed of by filling and reclaiming low ground, or it may be used for ballast, street grading or concrete aggregate. Although the State cannot aid financially in removing existing bars that may form damaging or unsightly obstructions, it can assist by preventing encroachments and erodable fills in the stream above.

CONTROL OF STREAMS THROUGH MUNICIPALITIES.

The condition of stream channels where they pass through towns and cities is often deplorable. Filth, ashes and debris are allowed to accumulate in them, while poorly constructed walls and inadequate

Mill Creek, Erie, Pa.
Showing refuse and non-uniform bridge openings.

Connoquenessing Creek, near Butler, Pa.
Showing bars formed by waste sand from glass plants.



Lehigh River, near Lehigh Gap.
Railroad embankment protected with slope paving.

conduits have been built. Since 1907, when the Commission was first given authority over such matters, conditions have been improved, but the State cannot hope to attain the desired degree of improvement without the active cooperation of municipal authorities and the general public. Municipal ordinances prohibiting such pollution are seldom enforced and the unsightly, unhealthful and dangerous condition is allowed to continue. Why this is so is difficult to conceive, as the streets which are only another type of public highway, are kept clean and well paved. Streams, where they pass through cities, are usually bordered by industrial or business establishments, but with proper bank protection, regulation and parking they might be made attractive.

As cities grow their future extension along river banks should be considered with the sanitary and flood possibilities in mind, and City Planning Commissions can do much in adding to the desirability of a city as a place of residence by providing for proper treatment of water fronts.

Material is allowed to be deposited in streams with the thought that floods will wash it away, but, although this is partly true, the channels remain throughout most of the year in an unsightly and dangerous condition and the material thus removed is deposited at points below, to the detriment of the channel and other towns. Where small streams are enclosed, the conduits are usually built of different sizes and shapes by various property owners, with the result that some are too small and some too large, and opportunity is offered for the lodgement of debris. The Commission knows of cases where such conduits, poorly constructed and of insufficient capacity, have failed during flood, causing the water to follow the surface and tear up and damage property below. Such streams should be covered with a conduit of standard size, adopted after careful study of possible flood flow, and protected at the entrance against the accumulation of wash and debris. The Commission has recently had occasion to suggest to one of the larger cities, in the consideration of an application for covering a short section of a stream running through it, that plans be prepared for the contemplated final control and confinement of the channel. When such a complete and final location and section is adopted and approved, future encroachments will be regulated by the permit issued, and all adjoining property owners and the city will have gained thereby.

The Commission recommends earnest consideration of these matters by cities, boroughs and villages and suggests a comprehensive study of the streams within their confines. Encroachments should be permitted only with the thought of their effect upon the regimen of the stream and ordinances should be passed by which the channels may be kept clean and unobstructed by debris and dangerous encroach-

ments. After such an ordinance is passed, it should be rigidly enforced and the stream policed; an earnest and fearless enforcement of the law will soon abate the practice of making streams dumping grounds and open sewers.

TRADES WASTE.

Trades waste from steel works, glass plants, paper mills, coke ovens, coal mines and other industries finds its way, either directly or indirectly, into the streams. By direct means is meant the dumping, sluicing or depositing of such material into the creek or river channels, while indirect methods include the deposition of waste on lands adjoining the stream, whence it may be washed into the water courses by heavy rains or excessive floods. Such methods are usually considered the most economical in disposing of trades waste, but such economy results in damage to others by filling the stream channel and adjoining flooded lands below.

In eastern Pennsylvania, culm deposits in streams are particularly noticeable, as an inspection of the rivers and creeks below mines has shown; the present beds of such streams are often many feet above the original levels. Study of this condition, under the Inventory Act of July 25th, 1913, resulted in recommendations to the Legislature, which, if adopted, will tend to bring about a practical cessation of the present practice.

In western Pennsylvania, similar conditions exist, although the wastes are mainly of a different character, consisting of slag, sand and other material from the coke, steel, glass and varied industries and waste from bituminous mines. In the Pittsburgh district, the beds of the Ohio, Allegheny and Monongahela rivers are covered with silt and refuse, although as a rule, greater damage has resulted from narrowing the flood channels by fills, walls, wharves and other encroachments.

Thousands of dollars are expended annually in dredging channels of waste material, which, in the early days, was foreign to the streams and which may be disposed of elsewhere. Culm may, for instance, be pumped back into the mines or collected in settling basins, fills of light material may be protected from erosion by riprapping or paving, sand and rouge from glass works may be settled out of the water and part of it reclaimed. A practical method can be found in almost every instance for disposal of trades waste without detriment to stream channels.

PROTECTION OF STREAM CHANNELS FROM EROSION.

Reconnoisance has indicated that the banks of rivers and streams are in many places being badly eroded, and this is especially true where they have been formed by fills of earth, slag and other waste

Ohio River, near Economy, Pa.

Showing obstruction formed by mooring wharf for coal barges, refuse collected behind the wharf after flood and collapsed ice breakers at upper end. Artificial harbor behind bank line could have been constructed immediately below.

Nearer view of above wharf and collapsed ice breakers, showing obstruction to flow and menace to navigation.

Allegheny River, near Sharpsburg.

Showing wall of concrete erected along river by a corporation to protect and improve conditions without orders from Federal or State authorities.

materials. In the majority of such cases, the slope is too steep and the material deposited without compacting and unprotected from erosion. It is often important to protect stream banks with riprapping, retaining walls or paving and the improvement of many miles of stream front by this means has been an important accomplishment of the Commission.

WHARVES.

Ice-breakers, wharves, jetties and piling have been placed in the larger streams, particularly the Ohio, Allegheny and Monongahela rivers, to act as artificial harbors, where boats may be moored and protected from floods and ice. This has resulted in a serious form of obstruction, particularly in densely built up, industrial centers, where the river banks and adjoining flat lands have been confined by fills, walls and buildings. Although there can be no doubt as to the usefulness and necessity for such wharves, it is believed that much less obstruction to the flow and deflection of the current would result if they had been designed along different lines. In many instances the obstruction could have been entirely eliminated and greater improvement and security obtained had the harbors been formed in indentures in the banks, or by excavation behind the normal line of bank. Storage and protection from damage during floods would thus have been afforded river craft and the often already narrowed channel maintained free of further encroachment.

ENCROACHMENT LINES.

The increased number of encroachment applications handled during 1913 and 1914 has developed the necessity for and advantages to be gained by the establishment of lines along rivers and smaller streams in conjested districts, beyond which no obstruction may be placed. Permanent encroachment lines thus established would differ from harbor lines, which are primarily located for navigation, in that they would provide channel capacity to discharge larger floods and result in uniform banks, unbroken by projections which tend to deflect and retard the current.

Harbor lines, as laid down by the U. S. War Department, are not encroachment lines and it is necessary to obtain the approval of this department before changes in the current, course or cross-section of a stream may be made.

In locating harbor lines, the main consideration has been navigation and sometimes navigability and flood capacity conflict, for it often improves a stream for navigation to reduce its channel. Both of these factors should be considered in determining upon the lines beyond which encroachments should not extend, and had the advisability of maintaining adequate stream channels been appreciated

earlier in the industrial development of the State, the question of controlling floods would not now be so vital.

Establishing encroachment lines is difficult, because channels have been encroached upon, in many districts, to such extent that sufficient capacity to carry floods without damage cannot be secured without the removal and relocation of bridges, buildings, walls, fills and railroads. The longer this matter is delayed, the worse conditions will become and the harder it will be to obtain the channel widths desired.

The establishment of encroachment lines would facilitate cooperation between the Water Supply Commission and municipalities, making possible a more rigid enforcement by the latter of regulations relative to the use of streams and their banks, and would often provide areas which could be reclaimed for park purposes, building or industrial sites.

It is recommended that the Legislature authorize the Water Supply Commission to establish encroachment lines along the rivers and streams, where in its judgment it is necessary.

INSPECTION.

The inspection work instituted by the Commission, in connection with permits for bridges and other forms of encroachments, have been systematically carried out during 1914. A total of 178 inspections have been made of encroachments for which permits have been issued, of which 92 were final inspections. Inspectors visited different sections of the State to familarize County Commissioners, Township Supervisors, corporations and the public generally with the requirements of the Commission in connection with applications which are brought before it, and in locating proposed encroachments and infringements of the Act. The public appreciates the wisdom of the law and it is seldom knowingly violated; as its results are more generally understood, greater cooperation and benefit will result.

DISCUSSION OF DATA REQUIRED IN THE CONSIDERATION OF APPLICATIONS FOR BRIDGES AND CULVERTS.

In order that applicants for bridges and culverts may have a better understanding of the data required as applied to the consideration of such applications by the Commission, a discussion of methods employed in determining waterway area is given. It is not intended to make this a treatise on the subject or to indicate a preference for any particular method or formula, although the necessity for proper selection and use of various formulae is considered.

The capacity of a bridge opening should suffice to carry, within economic limits, the greatest anticipated flood discharge, and methods, rules and formulae for determining it are many and varied; none of them are perfect and the question resolves itself into the

South Channel, North Branch Susquehanna River, at Sunbury, Pa.

Showing new bridge and piers of old bridge allowed to remain in the channel as an obstruction.

Same view as above showing old piers being removed by order of the Water Supply Commission.

Turtle Creek, near Pittsburgh.

Showing badly eroded slag bank and railroad fill encroaching on already narrowed channel.

selection of the best and most practical to suit all conditions. A common practice has been to estimate the size of opening without the use of accurate data, computations or formulae and, although this method might have been permissable where streams were spanned by wooden structures, in thinly populated districts, for permanent masonry and steel bridges, a more careful study of local conditions, past and expected floods, and solution of each problem is necessary.

The total investment in bridges and culverts is large and much of the work done in the past is being renewed. The adoption of an empirical rule may produce wastefully large, or inadequate structures, while a lack of knowledge of the magnitude of floods and how to use this information may prove costly.

The determination of surface discharge, or run-off, of any watershed is difficult, unless the measured flows, statistics of rainfall, temperature, high water marks, physical characteristics of the watershed and other data are available. No known formula includes all conditions, but the best ones take account of the amount and duration of rainfall, area, length and slope of watershed, whether the territory is sparsely or thickly settled, flat, forested, or the soil pervious or impervious.

The best estimate of the amount of run-off may be secured from careful observed measurements of all stages of the stream up to extreme flood height and extending over a long series of years, but even such records may be exceeded. The value of recording such observations is appreciated by the Federal and State Governments, which have undertaken this work.

Another method of estimating maximum discharge is to compare the watershed under consideration with others of similar size, physical character and rainfall, on which the run-off has been accurately measured over a series of years. It might appear from records of high water marks that flood stages are becoming higher, and bridge openings, which in past years were large enough to discharge maximum floods, are now too small. This is not due to a tendency toward increased flood intensities, but to the fact that as information accumulates, greater extremes are encountered.

It has been maintained that a flood may accumulate on the upstream side of an embankment and be discharged under a head through a cast iron pipe, box or arch culvert, or between bridge abutments with safety to the structure and embankment. This method however, does not always provide the required capacity and the damage to overflowed lands by backwater or the danger of washing out the embankment often does not receive proper attention. Embankments have been washed out and culverts damaged by the velocity

of escaping water, when this method has been pursued. More time and money spent in obtaining the required area would have prevented damage.

Boards of viewers, county, township and other authorities should give greater consideration to the choice of bridge sites, in order that advantage may be taken of sites favorable to greater velocities, making possible less area of opening and cost.

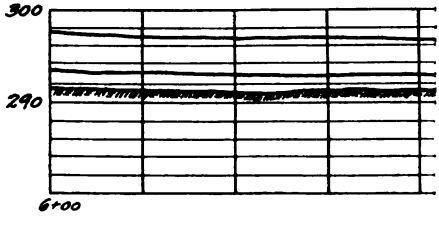
METHODS OF CALCULATING BRIDGE AND CULVERT AREAS.

It is not the purpose to discuss the scope and efficiency of the many formulae for the determination of the size of bridge openings, but it may be stated that they are of two classes: (1) for obtaining the maximum discharge, and (2) for obtaining the area of openings required to pass maximum flows. All of these formulae include the size of the drainage area, while some include the slope and length of the watershed and the precipitation. Almost all require the use of a coefficient depending upon the geological and physical features of the basin and the roughness of the bed and banks of the channel. The formulae in neither of these classes consider the slope of the flood water surface at the bridge site, which is the vital factor in determining capacity, nor do they take into account the shape of the opening.

The values of the coefficient in each formula are given for specific conditions and when 29 different formulae are applied to the same set of conditions, results varying from 120 to 4,000 square feet for the area of bridge opening are obtained, thus indicating the danger of their use without a thorough understanding of their applicability.

They are useful as a guide in estimating the necessary size of opening, in a preliminary way, where only general information is at hand and the value of the terms substituted therein are known to fit local conditions. The use of such formulae should not displace careful observations and the exercise of intelligent judgment in the application of proper data and formulae for fixing the final area and shape of opening.

The size of necessary openings depends mainly on the velocity of the stream, which is dependent on (1) water surface slope; (2) shape, width, depth and alignment of channel; (3) roughness of bed and banks; (4) position of mouth of tributary streams; (5) obstructions in channel. The mean velocity of flow is expressed in the Chezy Formula, $V=C\sqrt{RS}$, and the total discharge (Q) of a stream is found by multiplying the cross-sectional area by the mean velocity, or $Q=AC\sqrt{RS}$, in which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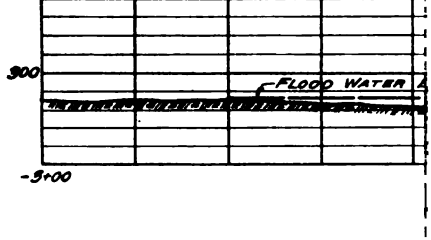
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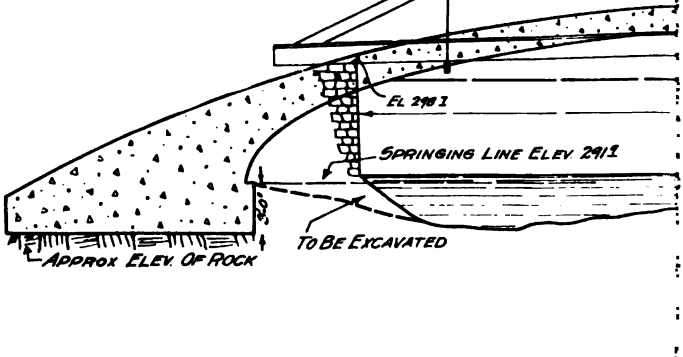

PRESENT WOODEN TR
EL 291.1
SPRINGING LINE ELEV 291.1
TO BE EXCAVATED
APPROX ELEV. OF ROCK

Q=discharge in cubic feet per second.
A=area of opening in square feet.
V=mean velocity in feet per second.
S=water surface slope.

$$R = \text{hydraulic radius} = \frac{A}{P}$$ where P is the wetted perimeter.

$$C = \text{a constant} = \frac{a + \frac{b}{n} + \frac{c}{s}}{1 + \left(a + \frac{c}{s}\right)\sqrt{\frac{n}{R}}}$$

where a, b and c are constants and n the coefficient of roughness of the bed of the stream.

Errors in the application of this formula result from incorrect measurements of the water surface slope, which is not the same at all stages, and from incorrect assumption of coefficients. The area of opening derived by this method is that included between bridge abutments below flood surface and sufficient space should be provided between this elevation and that of the under-clearance line to care for floating ice and debris and to provide a factor of safety depending upon the reliability of the data used.

The determination of the value of "C" in the expression $V = C\sqrt{RS}$, is an important factor in the use of the formula. The value of "C" may be determined from Kutter's Formula, which can be conveniently used in the form of a diagram.

Kutter's Formula is as follows:

$$C = \frac{\frac{1.811}{n} + 41.65 + \frac{0.00281}{s}}{1 + \left(41.65 + \frac{0.00281}{S}\right)\sqrt{\frac{n}{R}}}$$

The value of "n" depends on the roughness of the bed and banks of the channel and may be obtained from standard treatises on hydraulics.

When a conduit runs just full, it will not pass its maximum discharge, because the hydraulic radius is less than when the conduit

runs nearly full. The greatest discharge in semi-circular arch bridges occurs when the depth of water is between 0.9 and 0.95 of the distance from the bed of stream to the crown of arch.

REQUIREMENTS OF COMMISSION.

Accompanying all applications for permits to construct or make changes in bridges or culverts, the Commission requires plans and specifications in sufficient detail to show clearly the nature of the proposed work. This requires a survey of the immediate locality, from which a plan, cross-section and profile can be plotted. Plate 1 shows this information in a comprehensive manner and is reproduced, after minor changes, from a blue-print received in connection with an application. The data as contained in this cut is essential for a proper study of a proposed bridge. Cross-section drawings, as indicated in "Longitudinal Elevation" on Plate 1, should be made on the same scale both horizontally and vertically, all elevations should be clearly shown in figures and in the case of flood water height the date should also be given. Banks should be designated as right and left, looking downstream.

In addition to plans, the submission of the following information concerning the stream and site of the bridge will expedite action upon application: length; elevation at source, mouth and bridge site; slope; drainage area; character of country drained; elevation of normal and flood water; character of stream bed and banks; extent and depth of overflow during floods. Experience with past floods at or near the point in question should be obtained, and whether or not the bridge will be within backwater influence of tributary streams. Photographs of the old bridge and the proposed site of the new, if submitted with applications, facilitate action.

TABULATION OF APPROVED APPLICATIONS.

Table No. 12 shows the encroachment applications approved during 1914, arranged alphabetically and classified under separate headings for bridges, fills and miscellaneous structures:

TABLE NO. 12.—ENCROACHMENT APPLICATIONS APPROVED DURING 1914.
BRIDGES.

(Includes applications for bridges and culverts and additions and repairs to same).

Applicant.	Stream.	Location.	Date Approved.
Adams county commissioners,	Willoughby's run,	Near Gettysburg,	August 13th.
Aleppo township supervisors, Greene county,	Mudlick creek,	Near McCracken,	Sept. 10th.
Allegheny county commissioners,	Thompson's run,	Turtle Creek borough,	Sept. 26th.
Allegheny county commissioners,	Pine creek,	Shaler township (bridge No. 19),	July 16th.
Allegheny county commissioners,	Pine creek,	Near Allison Park, Hampton township,	July 16th.
Allegheny county commissioners,	Pine creek,	Near Edgwild Station,	August 13th.
Allegheny county commissioners,	Pine creek,	Near Glenshaw Station (bridge No. 15),	July 7th.
Allegheny county commissioners,	Pine creek,	Near Undercliff (bridge No. 14),	July 7th.
Allegheny county commissioners,	Pine creek,	½ mile northwest of Glenshaw,	July 7th.
Allegheny county commissioners,	Gourhead run,	½ mile north of Allison Park,	July 7th.
Allegheny county commissioners,	Loweries run, East branch,	Near West View,	June 23d.
Allegheny county commissioners,	Saw Mill run,	Elwyn,	August 13th.
Allegheny county commissioners,	Thompson's run,	Near Gascola,	June 11th.
Allegheny county commissioners,	Piney fork,	Near Stewart's School,	June 23d.
Allentown Terminal Railroad,	Jordan creek,	Allentown,	November 12th.
American Zinc and Chemical Co.,	Unnamed stream,	Langeloth, Washington county,	August 27th.
Archbald borough, Lackawanna county,	White Oak creek,	Laurel street, Archbald,	October 16th.
Armage township, supervisors, Mifflin county,	Troaster Valley run,	½ mile south Siglerville,	November 12th.
Armstrong county commissioners,	Allegheny river,	Ford City,	April 2d.
Baker, J. E.,	Donegal creek,	Near Chickies, Lancaster county (wagon bridge),	July 30th.
Baker, J. E.,	Donegal creek,	Near Chickies, Lancaster county (railroad bridge),	July 30th.
Baldridge, E. R & Company,	Frankstown Branch, Juniata river.	Near Claysburg, Blair county,	August 13th.
Baltimore and Ohio Railroad Company,	Beaver dam run,	Jenner township, Somerset county,	November 12th.
Baltimore and Ohio Railroad Company,	Quemahoning creek,	Jenner township, Somerset county,	November 12th.
Barnes Coal Company,	West Branch, Susquehanna river,	Near Hakerton, Cambria county,	August 27th.
Bedford township supervisors, Bedford county,	Earnest run,	Near Imlertown,	September 26th.
Berks county commissioners,	Schuylkill river,	Monocacy,	April 30th.
Berks county commissioners,	Clover creek,	Near Fleetwood,	July 30th.
Berks county commissioners,	Leaf creek,	Near Douglassville,	July 30th.
Berks county commissioners,	Spring creek,	Near Lambs Mill,	July 30th.
Bessemer and Lake Erie Railroad Company,	Unnamed stream,	Near Russellton, Allegheny county,	September 10th.
Bessemer and Lake Erie Railroad Company,	Unnamed stream,	Near Russellton, Allegheny county,	February 4th.
Bessemer and Lake Erie Railroad Company,	French creek,	Meadville, Crawford county,	February 26th.
Black Lick township supervisors, Indiana county,	Aultman's run,	3 miles above mouth,	May 11th.
Black Lick township supervisors, Indiana county,	Aultman's run,	3¼ miles above mouth,	May 21st.
Black Lick township supervisors, Cambria county,	South Branch, Blacklick creek,	560 feet east of Bracken,	August 27th.
Black Lick township supervisors, Cambria county,	Lincoln run,	4,000 feet north of Nanty-Glo,	August 27th.

BRIDGES.—Continued.

Applicant.	Stream.	Location.	Date Approved.
Blair county commissioners,	Dry run,	Near East Freedom,	January 20th.
Blair county commissioners,	Clover creek,	North Woodbury township,	May 21st.
Blair county commissioners,	Dry run,	Martinsburg,	May 21st.
Blair county commissioners,	Mill run,	Allegheny Furnace,	June 2d.
Blair county commissioners,	Roaring run,	Near Mt. Etna,	June 2d.
Blair county commissioners,	Poplar run,	Near Catfish House,	June 2d.
Blair county commissioners,	Arch Spring run,	Tyrone township,	June 2d.
Blair county commissioners,	Stoner's run,	Near Shoenberger,	June 2d.
Blair county commissioners,	Canoe creek,	Frankstown township,	June 2d.
Blair county commissioners,	Little Juniata river,	Near Logan School,	June 2d.
Blair county commissioners,	Woomer's run,	Snyder township,	June 2d.
Blair county commissioners,	Brush run,	South Lakemont,	June 11th.
Blair county commissioners,	Blair's Gap run,	Duncansville,	November 12th.
Brady township supervisors, Clearfield county,	East Branch creek,	3 miles south of Luthersburg,	June 11th.
Brady township supervisors, Clearfield county,	Little Anderson creek,	3½ miles southeast of Luthersburg,	June 23d.
Brown township supervisors, Mifflin county,	Honey creek,	Between Honeybrook and Reedsville,	September 10th.
Bucks county commissioners,	Swamp creek,	Near Erwinna,	June 23d.
Bucks county commissioners,	Iron Work creek,	Northampton township,	August 13th.
Bucks county commissioners,	Tohickon creek, branch of,	1 mile southeast of Richlandtown,	August 13th.
Butler county commissioners,	Coal run,	Near Butler,	April 30th.
Butler county commissioners,	Rocky run,	Near Ivywood,	June 2d.
Butler county commissioners,	Glade run,	Forward township,	June 2d.
Butler county commissioners,	Wolfe run,	Near Plains Church,	June 2d.
Butler county commissioners,	Seniconan run,	3 miles northeast of Petersville,	June 23d.
Butler county commissioners,	Big Bear creek,	1 mile west of Fairview,	June 23d.
Butler county commissioners,	Big Bear creek,	2 miles southwest of Fairview,	June 23d.
Butler county commissioners,	Little Buffalo run,	1 mile west of St. John's Church,	July 30th.
Butler county commissioners,	Connequenessing creek,	Monroe street, Butler,	October 16th.
Butler county commissioners,	Glade run,	Near Hays Mill, Middlesex township,	December 1st.
Butler county commissioners,	Muddy creek,	4 miles from source, Clay township,	December 1st.
Butler county commissioners,	Black's run,	Jacksville,	December 1st.
Butler county commissioners,	Breakneck creek,	Marshall,	December 1st.
Butler county commissioners,	Thorn creek,	Near West Jefferson,	December 1st.
Cambria county commissioners,	South Branch Lt. Conemaugh river.	South Fork,	April 16th.
Cambria county commissioners,	South Branch Black Lick creek,	Nanty-Glo,	April 16th.
Cambria county commissioners,	North Branch Black Lick creek,	Near Vetera,	July 30th.
Cambria county commissioners,	North Branch Conemaugh river,	Near Lilly,	July 30th.
Cambria county commissioners,	Bear run,	Near Barnesboro,	July 30th.
Cambria county commissioners,	Clearfield creek,	Near Van Ormer,	October 16th.
Cambria Steel Company,	Lancaster creek,	Naginey, Mifflin county,	October 16th.
Canoe township supervisors, Indiana county,	North Branch Lt. Mahoning creek.	3 miles southeast of Juneau,	July 30th.

Canoe township supervisors, Indiana county,	Wilson run,	1 mile east of Rossiter,	July 30th.
Canoe township supervisors, Indiana county,	Stiver run,	1.1 miles northwest of Juneau,	July 30th.
Carbon county commissioners,	Aquashicola creek,	Lehigh Gap,	June 2d.
Centre county and Clearfield county commissioners,	Moshannon creek,	Phillipsburg	July 7th.
Chartiers Southern Railway Company,	Speers run,	Below dam of North Strabane Water Company,	July 7th.
Chartiers Southern Railway Company,	Daniels run,	2.4 miles above mouth (bridge No. 37), Washington county.	August 13th.
Chartiers Southern Railway Company,	Little Chartiers creek,	1.6 miles from Eighty-Four, Washington county,	August 13th.
Chartiers Southern Railway Company,	Little Chartiers creek,	1.8 miles from Eighty-Four, Washington county,	August 13th.
Chartiers Southern Railway Company,	Unnamed stream,	2.6 miles south of Eighty-Four,	August 13th.
Chartiers Southern Railway Company,	Daniels run,	2.1 miles above mouth (bridge No. 38), Washington county.	August 13th.
Chartiers Southern Railway Company,	Daniels run,	6.8 miles above mouth, Washington county,	August 13th.
Chartiers Southern Railway Company,	Daniels run,	Bethlehem township, Washington county (Bridge No. 40).	September 10th.
Chartiers Southern Railway Company,	Daniels run,	Bethlehem township, Washington county (bridge No. 39).	September 10th.
Chartiers Southern Railway Company,	Daniels run,	Bethlehem township, Washington county (bridge No. 41).	September 10th.
Chartiers Southern Railway Company,	Daniels run,	Bethlehem township, Washington county (bridge No. 44).	September 10th.
Chartiers Southern Railway Company,	Daniels run,	Bethlehem township, Washington county (bridge No. 43).	September 10th.
Chartiers Southern Railway Company,	Little Chartiers creek,	3.6 miles south of Eighty-Four, Washington county.	September 10th.
Cherry Tree and Dixonville Railroad Company,	Dixon run,	Idamar, Indiana county,	June 23d.
Cherry Tree and Dixonville Railroad Company,	Dixon run,	Near Dixonville, Indiana county,	June 23d.
Cherry Tree and Dixonville Railroad Company,	Dixon run,	Near Clymer, Indiana county,	September 10th.
Chester county commissioners,	Buck run,	Stottsville, Sadsbury township,	March 19th.
Chester county commissioners,	Black Horse creek,	East Bradford township,	April 2d.
Chester county commissioners,	West Branch Brandywine creek,	Coatesville,	April 7th.
Chester county commissioners,	Pecopson creek,	2 miles south of Lenape,	April 16th.
Chester county commissioners,	White clay creek,	Near West Grove,	April 16th.
Chester county commissioners,	Buck run,	2 miles west of Nodena,	May 14th.
Chester county commissioners,	Doe run,	Near Springdell,	June 11th.
Chester county commissioners,	Brandywine creek,	Near Brandamore,	June 23d.
Chester county commissioners,	Pigeon creek,	Near Latshaw's Mill,	June 23d.
Church of the Brethren,	Soloman's run,	Johnstown,	December 10th.
Clarion county commissioners,	Clarion river,	Near Leeper,	April 2d.
Clarion Fire Brick Company,	Rod Bank creek,	St. Charles, Clarion county,	July 30th.
Clay township and Warwick township supervisors, Lancaster county.	Hammer creek,	Near Brunnersville,	December 1st.
Clinton township supervisors, Venango county,	Big Scrubgrass creek,	½ mile west of Clintonville,	September 26th.
Clymer, borough of,	Dixon run,	Clymer, Indiana county,	May 14th.
Conemaugh and Franklin Water Company,	Clapboard run,	Near Conemaugh, Cambria county,	December 2d.
Cohn, H. E.,	Booser's run,	Swatara township, Dauphin county,	August 13th.
Colebrookdale township supervisors, Berks county,	West Swamp creek,	1½ miles northeast of Berlinsville,	November 12th.
Columbia county commissioners,	Fishing creek,	1 mile from Orangeville,	August 13th.
Columbia Steel and Shafting Company,	Chartiers creek,	Rosslyn Farms, Allegheny county,	August 13th.
Conewago township supervisors, Dauphin county,	Unnamed stream,	¼ mile west of Aberdeen,	August 27th.
Crawford county commissioners,	Woodcock creek,	Dewey's Mill,	August 13th.
Crawford county commissioners,	Pine creek,	Titusville,	August 13th.
Crawford county commissioners,	Pine run,	Near Harmandsburg,	August 13th.
Crawford county commissioners,	McGrannahan Run,	Turnersville,	August 13th.
Cumberland Valley Railroad Company,	Susquehanna river,	Harrisburg,	May 14th.
Cumberland Valley Railroad Company,	Big Spring run,	Newville, Cumberland county,	June 11th.

BRIDGES.—Continued.

Applicant.	Stream.	Location.	Date Approved.
Daugherty township supervisors, Beaver county,	North Branch Block House run,	Near New Brighton,	August 27th.
Daugherty township supervisors, Beaver county,	North Branch Block House run,	Near New Brighton,	August 27th.
Daugherty township supervisors, Beaver county,	North Branch Block House run,	5 miles northeast of New Brighton,	August 27th.
Daugherty township supervisors, Beaver county,	Block House run,	Near New Brighton,	August 27th.
Daugherty township supervisors, Beaver county,	Block House run,	4 miles northeast of New Brighton,	August 27th.
Dauphin county commissioners,	Manada creek,	East Hanover township,	January 20th.
Dauphin county commissioners,	Keefer's run,	Near Millersburg,	July 7th.
Dauphin county commissioners,	Wiconisco creek,	Millersburg,	August 13th.
Dauphin county commissioners,	Swatara creek,	Middletown,	September 26th.
Delaware and Hudson Company, The,	Roaring brook,	Scranton,	August 13th.
Duquesne Light Company,	Ohio river,	Brunot Island, Allegheny county,	April 21st.
East Broad Top Railroad and Coal Company,	Augwick creek,	200 yards south of Augwick, Huntingdon county,	July 30th.
East Broad Top Railroad and Coal Company,	Blacklog creek,	300 yards north of Orbisonia, Huntingdon county,	July 30th.
East Broad Top Railroad and Coal Company,	Shade creek,	Near Orbisonia, Huntingdon county,	October 16th.
East Broad Top Railroad and Coal Company,	Three Springs creek,	100 yards south of Saltillo, Huntingdon county,	October 16th.
East Broad Top Railroad and Coal Company,	Hill Valley creek,	Near Mt. Union, Huntingdon county,	October 16th.
Eldred township supervisors, Jefferson county,	Red Lick run,	Near Brookville,	December 1st.
Eldred township supervisors, Jefferson county,	Mill creek, branch of,	5 miles northwest of Brookville,	December 10th.
Eldred township supervisors, Jefferson county,	Mill creek, branch of,	5¼ miles northwest of Brookville,	December 10th.
Elizabethtown and Deodate Street Railway Company,	Conewago creek,	Near Beverly, Lancaster and Dauphin counties,	July 7th.
Elk county commissioners,	Clarion river,	Ridgway,	April 16th.
Ellwood and Koppel Bridge Company,	Beaver river,	Koppel, Beaver county,	January 20th.
Erie Railroad Company,	Starrucca creek,	Near Lanesburg, Susquehanna county,	March 19th.
Fayette county commissioners,	Georges creek,	1½ miles south of Fairchance,	June 11th.
Fayette county commissioners,	Redstone creek,	Grindstone,	June 11th.
Fayette county commissioners,	Reslar's run,	7 miles from Connellsville,	August 27th.
Fayette county commissioners,	Hall's run,	1 mile southwest of Confluence,	September 10th.
Fayette county commissioners,	Champion creek,	2 miles from Champion,	September 10th.
Fayette county commissioners,	North Branch Brown's run,	1 mile southeast of McClellandtown,	September 10th.
Fayette county commissioners,	Middle run,	0.5 mile above mouth, German township,	September 10th.
Fayette county commissioners,	Dunlap creek,	¼ mile southeast of Merrittstown,	September 10th.
Fayette county commissioners,	Catts run,	Gray's Landing,	September 10th.
Frankford township supervisors, Cumberland county,	Unnamed stream,	1½ miles east of Blosserville,	November 12th.
Freehold township supervisors, Warren county,	Cotton creek,	2500 feet above mouth,	August 27th.
Fulton township supervisors, Lancaster county,	Puddle Duck creek,	Dorsey's Mill,	February 4th.
Galeton, borough of,	Pine creek,	Galeton, Potter county,	June 23d.
Greene county commissioners,	Pumpkin run,	Rice's Landing,	April 2d.
Greene county commissioners,	Rudolph run,	Between Wayne and Perry townships,	April 16th.
Greene county commissioners,	South Fork Ten Mile Creek,	6 miles east of Waynesburg,	April 16th.
Greene county commissioners,	North Branch Dunkard fork, Wheeling creek.	Rich Hill township,	April 16th.
Greene county commissioners,	Ruff's creek,	6 miles northwest of Waynesburg,	April 21st.
Greene county commissioners,	Hart's run,	4½ miles east of Cameron, W. Va.,	April 21st.

Greene county commissioners,	Ten Mile creek,	Near Waynesburg,	June 23d.
Greene township supervisors, Mercer county,	Unnamed stream,	2 miles south of Jamestown,	Sept. 26th.
Greenwood township supervisors, Clearfield county,	Little Clearfield creek,	3 miles east of Bower,	June 11th.
Greenwood township supervisors, Clearfield county,	McCracken run,	1 mile east of Bower,	June 11th.
Haines township supervisors, Centre county,	Pine creek,	Near Coburn,	July 16th.
Hanover township supervisors, Beaver county,	King's creek,	5 miles west of Frankfort,	April 30th.
Harrisburg, city of,	Spring creek,	Harrisburg,	December 1st.
Higens township supervisors, Schuylkill county,	Pine creek,	Near Fountain,	July 7th.
Higens township supervisors, Schuylkill county,	Pine creek,	Near Valley View,	July 7th.
Holbein, Joseph E.,	Connoquenessing creek,	Spruce Hill, Beaver county,	June 23d.
Hood, L. H.,	Little Clearfield creek,	Near Olanta, Clearfield county,	November 12th.
Indiana county commissioners,	McKees run,	Creekside,	April 21st.
Indiana county commissioners,	Aultman's run,	4 miles above mouth,	May 14th.
Jackson township supervisors, Cambria county,	Pergrim run,	4,000 feet south of Nanty-Glo,	September 10th.
Jackson township supervisors, Cambria county,	Pergrim run,	5,000 feet south of Nanty-Glo,	September 10th.
Jefferson Railroad Company,	Lackawanna river,	2.5 miles above Forest City, Susquehanna county,	March 19th.
Jefferson Railroad Company,	Starrucca creek,	½ mile above Stevens Point,	March 19th.
Johnstown, city of,	Conemaugh river,	Johnstown,	May 21st.
Jones township supervisors, Elk county,	Swamp creek,	2 miles northwest of Glen Hazel,	August 18th.
Jones township supervisors, Elk county,	Crooked creek,	1 mile east of Glen Hazel,	August 18th.
Knox township supervisors, Clearfield county,	Potts run,	Carnwath,	June 23d.
Lackawanna county commissioners,	Langen's brook,	Near Moscow, Covington township,	July 30th.
Lackawanna county commissioners,	La Touche creek,	Near Moscow Reservoir, Covington township,	July 30th.
Lackawanna county commissioners,	Van Brunt creek,	Moscaw,	July 30th.
Lackawanna county commissioners,	Van Brunt creek,	Moscaw,	September 26th.
Lackawanna county commissioners,	Roaring brook, tributary of,	Elmhurst,	December 10th.
Lamar township supervisors, Clinton county,	Duck run,	3 miles south of Mill Hall,	April 2d.
Lancaster county commissioners,	Conestoga creek,	Near Churchtown,	June 11th.
Lancaster county commissioners,	Conestoga creek,	East Earl township,	June 11th.
Lancaster and Ephrata Turnpike Road Company,	Kurtz run,	Near Landis Valley, Manheim township,	September 10th.
Lawrence county commissioners,	Hettenbaugh run,	Scott township,	January 20th.
Lawrence county commissioners,	Neshannock creek,	Wilmington township,	January 20th.
Lawrence county commissioners,	Connoquenessing creek,	Elwood City,	July 30th.
Lawrence county commissioners,	Hettenbaugh run,	Near Eastbrook,	August 27th.
Lawrence township supervisors, Tioga county,	Tioga Junction creek,	2 miles east of Tioga Junction,	August 18th.
Lehigh county commissioners,	Jordan creek,	Guthesville,	June 28d.
Lehigh county commissioners,	Cedar creek,	Dorney's Park,	August 13th.
Liberty township supervisors, Centre county,	Marsh creek,	1½ miles east of Ramola,	September 26th.
Ligonier township supervisors, Westmoreland county,	Hannah's run,	3 miles north of Ligonier,	August 27th.
Lower Mifflin township supervisors, Cumberland county,	Big run,	3 miles north of Newville,	August 13th.
Lower Mahoning township supervisors, Northumberland county.	McKees Half Fall run,	½ mile east of Dalmatia,	August 13th.
Luzerne county commissioners,	North Branch Susquehanna river.	Nanticoke,	April 16th.
Luzerne county commissioners,	North Branch Susquehanna river.	Wyoming,	July 7th.
Lycoming county commissioners,	Larry's creek,	Near Salladaysburg,	June 2nd.
Lycoming county commissioners,	Rock run,	Near Mawr Glen,	June 11th.
Lycoming county commissioners,	Beaver run,	4 miles above mouth, Penn township,	July 30th.
Lycoming county commissioners,	Laurel run,	Moreland township,	July 30th.
Lycoming county commissioners,	Hoaglands run,	5 miles above mouth, Cogan House township,	July 30th.
Lycoming county commissioners,	Pleasant stream,	Masten,	July 30th.
Manor township supervisors, Lancaster county,	India run,	3 miles north of Safe Harbor,	October 16th.
Mercer county commissioners,	Watson run,	Near West Middlesex,	February 4th.
Mercer county commissioners,	Unnamed stream,	½ mile south of Mercer,	June 11th.

BRIDGES.—Continued.

Applicant.	Stream.	Location.	Date Approved.
Blair county commissioners,	Dry run,	Near East Freedom,	January 20th.
Blair county commissioners,	Clover creek,	North Woodbury township,	May 21st.
Blair county commissioners,	Dry run,	Martinsburg,	May 21st.
Blair county commissioners,	Mill run,	Allegheny Furnace,	June 2d.
Blair county commissioners,	Roaring run,	Near Mt. Etna,	June 2d.
Blair county commissioners,	Poplar run,	Near Catfish House,	June 2d.
Blair county commissioners,	Arch Spring run,	Tyrone township,	June 2d.
Blair county commissioners,	Stoner's run,	Near Shoenberger,	June 2d.
Blair county commissioners,	Canoe creek,	Frankstown township,	June 2d.
Blair county commissioners,	Little Juniata river,	Near Logan School,	June 2d.
Blair county commissioners,	Woomer's run,	Snyder township,	June 2d.
Blair county commissioners,	Brush run,	South Lakemont,	June 11th.
Blair county commissioners,	Blair's Gap run,	Duncansville,	November 12th.
Brady township supervisors, Clearfield county,	East Branch creek,	3 miles south of Luthersburg,	June 11th.
Brady township supervisors, Clearfield county,	Little Anderson creek,	3½ miles southeast of Luthersburg,	June 23d.
Brown township supervisors, Mifflin county,	Honey creek,	Between Honeybrook and Reedsville,	September 10th.
Bucks county commissioners,	Swamp creek,	Near Erwinna,	June 23d.
Bucks county commissioners,	Iron Work creek,	Northampton township,	August 13th.
Bucks county commissioners,	Tohickon creek, branch of,	1 mile southeast of Richlandtown,	August 13th.
Butler county commissioners,	Coal run,	Near Butler,	April 30th.
Butler county commissioners,	Rocky run,	Near Ivywood,	June 2d.
Butler county commissioners,	Glade run,	Forward township,	June 2d.
Butler county commissioners,	Wolfe run,	Near Plains Church,	June 2d.
Butler county commissioners,	Seneconan run,	3 miles northeast of Petersville,	June 23d.
Butler county commissioners,	Big Bear creek,	1 mile west of Fairview,	June 23d.
Butler county commissioners,	Big Bear creek,	2 miles southwest of Fairview,	June 23d.
Butler county commissioners,	Little Buffalo run,	1 mile west of St. John's Church,	July 30th.
Butler county commissioners,	Connequenessing creek,	Monroe street, Butler,	October 16th.
Butler county commissioners,	Glade run,	Near Hays Mill, Middlesex township,	December 1st.
Butler county commissioners,	Muddy creek,	4 miles from source, Clay township,	December 1st.
Butler county commissioners,	Black's run,	Jacksville,	December 1st.
Butler county commissioners,	Breakneck creek,	Marshall,	December 1st.
Butler county commissioners,	Thorn creek,	Near West Jefferson,	December 1st.
Cambria county commissioners,	South Branch Lt. Conemaugh river.	South Fork,	April 16th.
Cambria county commissioners,	South Branch Black Lick creek,	Nanty-Glo,	April 16th.
Cambria county commissioners,	North Branch Black Lick creek,	Near Vetera,	July 30th.
Cambria county commissioners,	North Branch Conemaugh river,	Near Lilly,	July 30th.
Cambria county commissioners,	Bear run,	Near Barnesboro,	July 30th.
Cambria county commissioners,	Clearfield creek,	Near Van Ormer,	October 16th.
Cambria Steel Company,	Lancaster creek,	Naginey, Mifflin county,	October 16th.
Canoe township supervisors, Indiana county,	North Branch Lt. Mahoning creek.	3 miles southeast of Juneau,	July 30th.

Canoe township supervisors, Indiana county,	Wilson run,	1 mile east of Rossiter,	July 30th.
Canoe township supervisors, Indiana county,	Stiver run,	1.1 miles northwest of Juneau,	July 30th.
Carbon county commissioners,	Aquashicola creek,	Lehigh Gap,	June 2d.
Centre county and Clearfield county commissioners,	Moshannon creek,	Phillipsburg	July 7th.
Chartiers Southern Railway Company,	Speers run,	Below dam of North Strabana Water Company,	July 7th.
Chartiers Southern Railway Company,	Daniels run,	2.4 miles above mouth (bridge No. 37), Washington county.	August 13th.
Chartiers Southern Railway Company,	Little Chartiers creek,	1.6 miles from Eighty-Four, Washington county,	August 13th.
Chartiers Southern Railway Company,	Little Chartiers creek,	1.8 miles from Eighty-Four, Washington county,	August 13th.
Chartiers Southern Railway Company,	Unnamed stream,	2.6 miles south of Eighty-Four,	August 13th.
Chartiers Southern Railway Company,	Daniels run,	2.1 miles above mouth (bridge No. 38), Washington county.	August 13th.
Chartiers Southern Railway Company,	Daniels run,	6.8 miles above mouth, Washington county,	August 13th.
Chartiers Southern Railway Company,	Daniels run,	Bethlehem township, Washington county (Bridge No. 40).	September 10th.
Chartiers Southern Railway Company,	Daniels run,	Bethlehem township, Washington county (bridge No. 39).	September 10th.
Chartiers Southern Railway Company,	Daniels run,	Bethlehem township, Washington county (bridge No. 41).	September 10th.
Chartiers Southern Railway Company,	Daniels run,	Bethlehem township, Washington county (bridge No. 44).	September 10th.
Chartiers Southern Railway Company,	Daniels run,	Bethlehem township, Washington county (bridge No. 43).	September 10th.
Chartiers Southern Railway Company,	Little Chartiers creek,	3.6 miles south of Eighty-Four, Washington county.	September 10th.
Cherry Tree and Dixonville Railroad Company,	Dixon run,	Idamar, Indiana county,	June 23d.
Cherry Tree and Dixonville Railroad Company,	Dixon run,	Near Dixonville, Indiana county,	June 23d.
Cherry Tree and Dixonville Railroad Company,	Dixon run,	Near Clymer, Indiana county,	September 10th.
Chester county commissioners,	Buck run,	Stottsville, Sadsbury township,	March 19th.
Chester county commissioners,	Black Horse creek,	East Bradford township,	April 2d.
Chester county commissioners,	West Branch Brandywine creek,	Coatesville,	April 7th.
Chester county commissioners,	Pecopson creek,	2 miles south of Lenape,	April 16th.
Chester county commissioners,	White clay creek,	Near West Grove,	April 16th.
Chester county commissioners,	Buck run,	2 miles west of Nodena,	May 14th.
Chester county commissioners,	Doe run,	Near Springdell,	June 11th.
Chester county commissioners,	Brandywine creek,	Near Brandamore,	June 23d.
Chester county commissioners,	Pigeon creek,	Near Latshaw's Mill,	June 23d.
Church of the Brethren,	Soloman's run,	Johnstown,	December 10th.
Clarion county commissioners,	Clarion river,	Near Leeper,	April 2d.
Clarion Fire Brick Company,	Rod Bank creek,	St. Charles, Clarion county,	July 30th.
Clay township and Warwick township supervisors, Lancaster county.	Hammer creek,	Near Brunnersville,	December 1st.
Clinton township supervisors, Venango county,	Big Scrubgrass creek,	½ mile west of Clintonville,	September 26th.
Clymer, borough of,	Dixon run,	Clymer, Indiana county,	May 14th.
Conemaugh and Franklin Water Company,	Clapboard run,	Near Conemaugh, Cambria county,	December 2d.
Cohn, H. E.,	Booser's run,	Swatara township, Dauphin county,	August 13th.
Colebrookdale township supervisors, Berks county,	West Swamp creek,	1½ miles northeast of Berlinsville,	November 12th.
Columbia county commissioners,	Fishing creek,	1 mile from Orangeville,	August 13th.
Columbia Steel and Shafting Company,	Chartiers creek,	Rosslyn Farms, Allegheny county,	August 13th.
Conewago township supervisors, Dauphin county,	Unnamed stream,	¾ mile west of Aberdeen,	August 27th.
Crawford county commissioners,	Woodcock creek,	Dewey's Mill,	August 13th.
Crawford county commissioners,	Pine creek,	Titusville,	August 13th.
Crawford county commissioners,	Pine run,	Near Harmandsburg,	August 13th.
Crawford county commissioners,	McGrannahan Run,	Turnersville,	August 13th.
Cumberland Valley Railroad Company,	Susquehanna river,	Harrisburg,	May 14th.
Cumberland Valley Railroad Company,	Big Spring run,	Newville, Cumberland county,	June 11th.

BRIDGES.—Continued.

Applicant.	Stream.	Location.	Date Approved.
Daugherty township supervisors, Beaver county,	North Branch Block House run,	Near New Brighton,	August 27th.
Daugherty township supervisors, Beaver county,	North Branch Block House run,	Near New Brighton,	August 27th.
Daugherty township supervisors, Beaver county,	North Branch Block House run,	5 miles northeast of New Brighton,	August 27th.
Daugherty township supervisors, Beaver county,	Block House run,	Near New Brighton,	August 27th.
Daugherty township supervisors, Beaver county,	Block House run,	4 miles northeast of New Brighton,	August 27th.
Dauphin county commissioners,	Manada creek,	East Hanover township,	January 20th.
Dauphin county commissioners,	Keefer's run,	Near Millersburg,	July 7th.
Dauphin county commissioners,	Wiconisco creek,	Millersburg,	August 18th.
Dauphin county commissioners,	Swatara creek,	Middletown,	September 26th.
Delaware and Hudson Company, The,	Roaring brook,	Scranton,	August 13th.
Duquesne Light Company,	Ohio river,	Brunot Island, Allegheny county,	April 21st.
East Broad Top Railroad and Coal Company,	Augwick creek,	200 yards south of Augwick, Huntingdon county,	July 30th.
East Broad Top Railroad and Coal Company,	Blacklog creek,	300 yards north of Orbisonia, Huntingdon county,	July 30th.
East Broad Top Railroad and Coal Company,	Shade creek,	Near Orbisonia, Huntingdon county,	October 16th.
East Broad Top Railroad and Coal Company,	Three Springs creek,	100 yards south of Saltillo, Huntingdon county,	October 16th.
East Broad Top Railroad and Coal Company,	Hill Valley creek,	Near Mt. Union, Huntingdon county,	October 16th.
Eldred township supervisors, Jefferson county,	Red Lick run,	Near Brookville,	December 1st.
Eldred township supervisors, Jefferson county,	Mill creek, branch of,	5 miles northwest of Brookville,	December 10th.
Eldred township supervisors, Jefferson county,	Mill creek, branch of,	5¾ miles northwest of Brookville,	December 10th.
Elizabethtown and Deodate Street Railway Company,	Conewago creek,	Near Beverly, Lancaster and Dauphin counties,	July 7th.
Elk county commissioners,	Clarion river,	Ridgway,	April 16th.
Ellwood and Koppel Bridge Company,	Beaver river,	Koppel, Beaver county,	January 20th.
Erie Railroad Company,	Starrucca creek,	Near Lanesburg, Susquehanna county,	March 19th.
Fayette county commissioners,	Georges creek,	1½ miles south of Fairchance,	June 11th.
Fayette county commissioners,	Redstone creek,	Grindstone,	June 11th.
Fayette county commissioners,	Reslar's run,	7 miles from Connellsville,	August 27th.
Fayette county commissioners,	Hall's run,	1 mile southwest of Confluence,	September 10th.
Fayette county commissioners,	Champion creek,	2 miles from Champion,	September 10th.
Fayette county commissioners,	North Branch Brown's run,	1 mile southeast of McClellandtown,	September 10th.
Fayette county commissioners,	Middle run,	0.5 mile above mouth, German township,	September 10th.
Fayette county commissioners,	Dunlap creek,	¼ mile southeast of Merrittstown,	September 10th.
Fayette county commissioners,	Catts run,	Gray's Landing,	September 10th.
Frankford township supervisors, Cumberland county,	Unnamed stream,	1¼ miles east of Blosserville,	November 12th.
Freehold township supervisors, Warren county,	Cotton creek,	2500 feet above mouth,	August 27th.
Fulton township supervisors, Lancaster county,	Puddle Duck creek,	Dorsey's Mill,	February 4th.
Galeton, borough of,	Pine creek,	Galeton, Potter county,	June 23d.
Greene county commissioners,	Pumpkin run,	Rice's Landing,	April 2d.
Greene county commissioners,	Rudolph run,	Between Wayne and Perry townships,	April 16th.
Greene county commissioners,	South Fork Ten Mile Creek,	6 miles east of Waynesburg,	April 16th.
Greene county commissioners,	North Branch Dunkard fork, Wheeling creek.	Rich Hill township,	April 16th.
Greene county commissioners,	Ruff's creek,	6 miles northwest of Waynesburg,	April 21st.
Greene county commissioners,	Hart's run,	4¼ miles east of Cameron, W. Va.,	April 21st.

Greene county commissioners,	Ten Mile creek,	Near Waynesburg,	June 23d.
Greene township supervisors, Mercer county,	Unnamed stream,	2 miles south of Jamestown,	Sept. 26th.
Greenwood township supervisors, Clearfield county,	Little Clearfield creek,	3 miles east of Bower,	June 11th.
Greenwood township supervisors, Clearfield county,	McCracken run,	1 mile east of Bower,	June 11th.
Haines township supervisors, Centre county,	Pine creek,	Near Coburn,	July 16th.
Hanover township supervisors, Beaver county,	King's creek,	5 miles west of Frankfort,	April 30th.
Harrisburg, city of,	Spring creek,	Harrisburg,	December 1st.
Higens township supervisors, Schuylkill county,	Pine creek,	Near Fountain,	July 7th.
Higens township supervisors, Schuylkill county,	Pine creek,	Near Valley View,	July 7th.
Holbein, Joseph E.,	Connoquenessing creek,	Spruce Hill, Beaver county,	June 23d.
Hood, L. H.,	Little Clearfield creek,	Near Olanta, Clearfield county,	November 12th.
Indiana county commissioners,	McKees run,	Creekside,	April 21st.
Indiana county commissioners,	Aultman's run,	4 miles above mouth,	May 14th.
Jackson township supervisors, Cambria county,	Pergrim run,	4,000 feet south of Nanty-Glo,	September 10th.
Jackson township supervisors, Cambria county,	Pergrim run,	5,000 feet south of Nanty-Glo,	September 10th.
Jefferson Railroad Company,	Lackawanna river,	2.5 miles above Forest City, Susquehanna county,	March 19th.
Jefferson Railroad Company,	Starrucca creek,	½ mile above Stevens Point,	March 19th.
Johnstown, city of,	Conemaugh river,	Johnstown,	May 21st.
Jones township supervisors, Elk county,	Swamp creek,	2 miles northwest of Glen Hazel,	August 13th.
Jones township supervisors, Elk county,	Crooked creek,	1 mile east of Glen Hazel,	August 13th.
Knox township supervisors, Clearfield county,	Potts run,	Carnwath,	June 23d.
Lackawanna county commissioners,	Langen's brook,	Near Moscow, Covington township,	July 30th.
Lackawanna county commissioners,	La Touche creek,	Near Moscow Reservoir, Covington township,	July 30th.
Lackawanna county commissioners,	Van Brunt creek,	Moscaw,	July 30th.
Lackawanna county commissioners,	Van Brunt creek,	Moscaw,	September 26th.
Lackawanna county commissioners,	Roaring brook, tributary of,	Elmhurst,	December 10th.
Lamar township supervisors, Clinton county,	Duck run,	3 miles south of Mill Hall,	April 2d.
Lancaster county commissioners,	Conestoga creek,	Near Churchtown,	June 11th.
Lancaster county commissioners,	Conestoga creek,	East Earl township,	June 11th.
Lancaster and Ephrata Turnpike Road Company,	Kurtz run,	Near Landis Valley, Manheim township,	September 10th.
Lawrence county commissioners,	Hettenbaugh run,	Scott township,	January 20th.
Lawrence county commissioners,	Neshannock creek,	Wilmington township,	January 20th.
Lawrence county commissioners,	Connoquenessing creek,	Elwood City,	July 30th.
Lawrence county commissioners,	Hettenbaugh run,	Near Eastbrook,	August 27th.
Lawrence township supervisors, Tioga county,	Tioga Junction creek,	2 miles east of Tioga Junction,	August 13th.
Lehigh county commissioners,	Jordan creek,	Guthersville,	June 23d.
Lehigh county commissioners,	Cedar creek,	Dorney's Park,	August 13th.
Liberty township supervisors, Centre county,	Marsh creek,	1¼ miles east of Ramola,	September 26th.
Ligonier township supervisors, Westmoreland county,	Hannah's run,	3 miles north of Ligonier,	August 27th.
Lower Mifflin township supervisors, Cumberland county,	Big run,	3 miles north of Newville,	August 13th.
Lower Mahoning township supervisors, Northumberland county.	McKees Half Fall run,	½ mile east of Dalmatia,	August 13th.
Luzerne county commissioners,	North Branch Susquehanna river.	Nanticoke,	April 16th.
Luzerne county commissioners,	North Branch Susquehanna river.	Wyoming,	July 7th.
Lycoming county commissioners,	Larry's creek,	Near Salladaysburg,	June 2nd.
Lycoming county commissioners,	Rock run,	Near Mawr Glen,	June 11th.
Lycoming county commissioners,	Beaver run,	4 miles above mouth, Penn township,	July 30th.
Lycoming county commissioners,	Laurel run,	Moreland township,	July 30th.
Lycoming county commissioners,	Hoaglands run,	5 miles above mouth, Cogan House township,	July 30th.
Lycoming county commissioners,	Pleasant stream,	Masten,	July 30th.
Manor township supervisors, Lancaster county,	India run,	3 miles north of Safe Harbor,	October 16th.
Mercer county commissioners,	Watson run,	Near West Middlesex,	February 4th.
Mercer county commissioners,	Unnamed stream,	½ mile south of Mercer,	June 11th.

BRIDGES.—Continued.

Applicant.	Stream.	Location.	Date Approved.
Mercer county commissioners,	Lick's run,	West Salem township,	June 11th.
Mercer county commissioners,	Skunk run,	Fairview township,	June 11th.
Mercer county commissioners,	Robinson run,	East Lackawannock township,	June 11th.
Mercer county commissioners,	Zahniser's run,	Jefferson township,	June 11th.
Mercer county commissioners,	Reno run,	Jefferson township,	June 11th.
Mercer county commissioners,	Hann run,	Hickory township,	June 11th.
Mercer county commissioners,	Folk run,	French Creek township,	June 11th.
Mercer county commissioners,	Reznor's run,	Delaware township,	June 11th.
Mercer county commissioners,	Unnamed stream,	Otter Creek township,	June 11th.
Mercer county commissioners,	Unnamed stream,	1 mile north of Petersburg,	June 11th.
Mercer county commissioners,	Gill's run,	Wolf Creek township,	June 11th.
Mercer county commissioners,	Black run,	Findley township,	June 11th.
Mercer county commissioners,	Bierman run,	Otter Creek township,	June 11th.
Mercer county commissioners,	Minnis run,	Sugar Grove township,	June 11th.
Mercer county commissioners,	Little Shenango river,	Greenville,	July 7th.
Mercer county commissioners,	Otter creek,	Near Fredonia,	August 27th.
Mill Creek township supervisors, Erie county,	Cascade run,	Near Erie,	August 13th.
Montgomery county commissioners,	Swamp creek,	Zieglerville,	June 11th.
Montgomery county commissioners,	Sanatoga creek,	Sanatoga Park,	June 23d.
Montgomery county commissioners,	Skippack creek,	Near Skippack,	July 16th.
Montgomery county commissioners,	Tacony creek,	Glenside,	August 13th.
Montour county commissioners,	Chillisquaque creek,	Liberty township,	June 23d.
Montour Railroad Company,	Miller's run, tributary of,	Near Bishop, Washington county,	February 19th.
Montour Railroad Company,	McPherson's run,	¼ miles west of Greer, Washington county,	February 19th.
Montour Railroad Company,	Brush run, branch of,	½ mile west of McMurray,	February 19th.
Montour Railroad Company,	Brush run, branch of,	McMurray, Washington county,	February 19th.
Montour Railroad Company,	Miller's run,	½ mile west of Venice, Washington county,	February 19th.
Montour Railroad Company,	Robinson's run,	Near McDonald, Washington county,	February 19th.
Montour Railroad Company,	Miller's run,	Near Venice, Washington county,	February 19th.
Montour Railroad Company,	Brush run, branch of,	1¼ miles east of McMurray, Washington county,	February 19th.
Montour Railroad Company,	Brush run, branch of,	½ mile east of McMurray, Washington county,	February 19th.
Montour Railroad Company,	Miller's run,	Venice, Washington county,	February 19th.
Montour Railroad Company,	Chartiers creek,	East of Greer, Washington county,	February 19th.
Montour Railroad Company,	Brush run,	Hills, Washington county,	February 19th.
Montour Railroad Company,	Brush run,	¼ mile west of Thompsonville,	February 19th.
Montour Railroad Company,	Brush run,	Thompsonville, Washington county,	February 19th.
Montour Railroad Company,	Brush run,	Near Thompsonville,	February 19th.
Montour Railroad Company,	Unnamed stream,	Near North Star, Washington county,	February 19th.
Mount Holly Springs, borough of,	Mountain creek,	Mt. Holly Springs, Cumberland county,	September 26th.
Mt. Pleasant township supervisors, Westmoreland county,	Shupes run,	Near Frick Coke Company's Standard Works,	June 23d.
Mt. Pleasant township supervisors, Westmoreland county,	Trauger run,	Near Frick Coke Company's United Works,	June 23d.
North Branch township supervisors, Wyoming county,	Lovelton run,	Lovelton,	December 10th.

North Mahoning township, Indiana county,	Mudlick run,	3 miles west of Marchand,	August 27th.
Northern Central Railway Company,	Boyles run,	Near Fishers Ferry, Northumberland county,	July 7th.
Northampton county commissioners,	Monocacy creek,	Near Bath,	August 13th.
Northampton county commissioners,	Martin's creek,	Bangor,	August 13th.
Northampton county commissioners,	Bushkill creek,	Near Aluto,	October 16th.
Northampton county commissioners,	Hokendauqua creek, branch of,	Near Beersville,	October 16th.
Northumberland and Union county commissioners,	West Branch Susquehanna river,	Milton,	February 19th.
Northumberland county commissioners,	Shamokin creek,	Deibler,	September 10th.
Northumberland county commissioners,	Shamokin creek,	Keefer,	September 10th.
Northumberland county commissioners,	Warriors Run,	Delaware township,	September 26th.
Northumberland county commissioners,	Housel run,	200 feet above mouth, Chillisquaque township,	September 26th.
Northumberland county commissioners,	Shamokin creek,	Walnut street, Shamokin,	November 12th.
Northumberland county commissioners,	Plum creek,	Near Seven Points,	December 1st.
Nypano Railroad Company,	Conneaut Lake creek,	½ mile east of Geneva, Crawford county,	June 23d.
Oil Creek township supervisors, Crawford county,	Thompson creek,	Rear Shelmadine Springs,	August 27th.
Oil Creek township supervisors, Crawford county,	Bogg creek,	Near Hydetown,	September 26th.
Oil Creek township supervisors, Crawford county,	Bogg creek,	Near Hydetown,	September 26th.
Penn township supervisors, Centre county,	Unnamed stream,	¼ mile east of Coburn,	August 27th.
Penn township supervisors, Snyder county,	Laudenslager creek,	1½ miles northwest of Selinsgrove,	November 12th.
Pennsylvania Company, The,	Shenango river,	New Castle,	January 20th.
Pennsylvania Railroad Company,	Beaver run,	Philipsburg, Clearfield county,	January 2d.
Pennsylvania Railroad Company,	Wallace run,	South of Snow Shoe Intersection, Centre county,	March 7th.
Pennsylvania Railroad Company,	Warrior's Mark run,	Warrior's Mark, Huntingdon county,	March 7th.
Pennsylvania Railroad Company,	Shull run,	Near Rockland, Venango county,	March 19th.
Pennsylvania Railroad Company,	Alexander run,	Madera, Clearfield county,	March 19th.
Pennsylvania Railroad Company,	Little Sewickley creek,	Near Cowansburg, Westmoreland county,	April 2d.
Pennsylvania Railroad Company,	Spring creek,	Near Bellefonte, Centre county,	April 2d.
Pennsylvania Railroad Company,	Big Sewickley creek,	Near Milbel, Westmoreland county,	April 2d.
Pennsylvania Railroad Company,	Schuylkill river,	Phoenixville, Chester county,	April 7th.
Pennsylvania Railroad Company,	Mays run,	Near Kennerdell, Venango county,	April 16th.
Pennsylvania Railroad Company,	West Branch Susquehanna river,	Mahaffey, Clearfield county,	July 7th.
Pennsylvania Railroad Company,	Little Bald Eagle creek,	Near Tyrone, Blair county,	May 14th.
Pennsylvania Railroad Company,	Laurel run,	Near Vail, Blair county,	May 21st.
Pennsylvania Railroad Company,	Conemaugh river,	Dornock Point, Cambria county,	May 21st.
Pennsylvania Railroad Company,	Little Bald Eagle creek,	Near Bald Eagle, Blair county,	June 2d.
Pennsylvania Railroad Company,	Roaring run,	Near Bigler, Clearfield county,	June 11th.
Pennsylvania Railroad Company,	Moshannon creek,	21.13 miles from Tyrone, Centre county,	June 11th.
Pennsylvania Railroad Company,	Rattlesnake creek,	Perry township, Clarion county,	June 11th.
Pennsylvania Railroad Company,	Pennypack creek,	Holmesburg Junction, Philadelphia,	June 11th.
Pennsylvania Railroad Company,	Latshaw run,	Near Parker Landing, Clarion county,	June 11th.
Pennsylvania Railroad Company,	Fishers run,	Martha, Centre county,	June 11th.
Pennsylvania Railroad Company,	Brubaker run,	Near Hastings, Cambria county,	June 11th.
Pennsylvania Railroad Company,	Wallace run,	30.12 miles from Tyrone, Centre county,	July 7th.
Pennsylvania Railroad Company,	Bald Eagle creek,	16.69 miles from Tyrone, Centre county,	July 7th.
Pennsylvania Railroad Company,	Mosquito creek,	DuBoistown, Lycoming county,	July 7th.
Pennsylvania Railroad Company,	Thompson's run,	Near Martha, Centre county,	July 7th.
Pennsylvania Railroad Company,	Schuylkill river,	Pottsville, Schuylkill county,	July 16th.
Pennsylvania Railroad Company,	Driftwood Branch, Sinnemahoning creek.	Near Sterling run, Cameron county,	July 30th.
Pennsylvania Railroad Company,	Mill creek,	At Junction with Conestoga creek, Lancaster county,	July 30th.
Pennsylvania Railroad Company,	Spaulding run,	Near Glynden, Crawford county,	August 13th.
Pennsylvania Railroad Company,	East Branch Oil creek,	Near Glynden, Crawford county,	August 13th.
Pennsylvania Railroad Company,	Schuylkill river,	Manayunk, Philadelphia,	August 13th.
Pennsylvania Railroad Company,	Anchor run,	South of Parkers Landing, Clarion county,	August 27th.
Pennsylvania Railroad Company,	Wolf run,	Near Harvey's Run, Jefferson county,	August 27th.

BRIDGES.—Continued.

Applicant.	Stream.	Location.	Date Approved.
Pennsylvania Railroad Company,	Chartiers creek,	Near Edgecliff, Westmoreland county,	September 10th.
Pennsylvania Railroad Company,	Cove creek,	Near Covallen, Perry county,	September 26th.
Pennsylvania Railroad Company,	Big Sandy run,	Near Snow Shoe, Centre county,	October 16th.
Pennsylvania Railroad Company,	Sulphur run,	Near Snow Shoe, Centre county,	October 16th.
Pennsylvania Railroad Company,	French creek,	Near Corry, Erie county,	November 12th.
Pennsylvania Railroad Company,	Oil creek,	Near Titusville, Crawford county,	December 1st.
Perry township supervisors, Jefferson county,	Rose run,	4¼ miles west of Punxsutawney,	July 30th.
Perry township supervisors, Greene county,	Fox creek,	3½ miles west of Mt. Morris,	September 10th.
Philadelphia, city of,	Indian run, east branch,	Sherwood avenue, Philadelphia,	December 1st.
Philadelphia and Chester Valley Railway Company,	Valley creek,	Near Cedar Hollow, Chester county,	December 1st.
Philadelphia and Reading Railway Company,	Brandywine creek,	3,000 feet south of Mortonville, Chester county,	July 16th.
Philadelphia and Reading Railway Company,	Branch of West Branch Neshaminy creek.	4,600 feet north of Colmar, Montgomery county,	August 27th.
Philadelphia and Reading Railway Company,	Mill creek,	1,500 feet south of Berne, Berks county,	November 12th.
Philadelphia and Reading Railway Company,	Maiden creek,	1,000 feet south of Albany, Berks county,	November 12th.
Philadelphia and Reading Railway Company,	Saucony creek,	Virginville, Berks county,	December 1st.
Philadelphia and Reading Railway Company,	Little Schuylkill river,	Tamaqua, Schuylkill county,	December 1st.
Pike county commissioners,	Dingman's creek,	Near Dingman's Ferry,	August 13th.
Pike county commissioners,	Blooming Grove creek,	2½ miles above mouth, near Glen Eyre,	August 13th.
Pike township supervisors, Clearfield county,	Hogback run,	1 mile northeast of Bloomington,	September 10th.
Pike township supervisors, Clearfield county,	Hartshorn run,	1½ miles from Curwensville,	September 26th.
Piney township supervisors, Clearfield county,	Rinersburg run,	1 mile south of Curllsville,	August 27th.
Pitt Gas Coal Company,	Ten Mile creek,	2 miles above mouth, Washington county,	July 30th.
Pittsburgh, Chartiers and Youghiogheny Railroad Co.,	Little Chartiers creek,	4.2 miles above mouth, Washington county,	August 13th.
Pittsburgh, Chartiers and Youghiogheny Railroad Co.,	Chartiers creek,	0.35 miles below mouth of Little Chartiers creek, Washington county.	August 13th.
Pittsburgh, Chartiers and Youghiogheny Railroad Co.,	Little Chartiers creek,	7 miles above mouth, Washington county,	August 13th.
Pittsburgh, Chartiers and Youghiogheny Railroad Co.,	Unnamed stream,	Near mouth of Little Chartiers creek, Washington county.	August 13th.
Pittsburgh, Chartiers and Youghiogheny Railroad Co.,	Little Chartiers creek,	6.4 miles above mouth, Washington county,	August 13th.
Pittsburgh, Chartiers and Youghiogheny Railroad Co.,	Little Chartiers creek,	5.4 miles above mouth, Washington county,	August 13th.
Pittsburgh, Chartiers and Youghiogheny Railroad Co.,	Little Chartiers creek,	2.2 miles north of Eighty-Four, Washington county,	September 26th.
Pittsburgh, Chartiers and Youghiogheny Railroad Co.,	Unnamed stream,	2.1 miles north of Eighty-Four, Washington county,	September 26th.
Pittsburgh, Chartiers and Youghiogheny Railroad Co.,	Vances run,	Eighty-Four, Washington county,	September 26th.
Pittsburgh, Chartiers and Youghiogheny Railroad Co.,	Unnamed stream,	Wylandville, Washington county,	September 26th.
P. C. C. & St. L. Railway Company,	Burgetts fork, Raccoon creek,	1.7 miles south of Burgettstown, Washington county,	July 30th.
P. C. C. & St. L. Railway Company,	Unnamed stream,	200 feet east of Noblestown, Allegheny county,	July 30th.
Pittsburgh Railways Company,	Unnamed stream,	1.0 mile southwest of White Ash, Allegheny county,	September 10th.
Pittsburgh and Lake Erie Railroad Company,	Beaver river,	Newport, Lawrence county,	January 20th.
Pittsburgh and Lake Erie Railroad Company,	Along Beaver river,	Near Beaver Falls, Beaver county,	December 22d.
Pittsburgh and Lake Erie Railroad Company,	Along Beaver river,	Beaver Falls, Beaver county,	December 22d.
Pittsburgh and Lake Erie Railroad Company,	Along Beaver river,	Beaver Falls, Beaver county,	December 22d.
Pittsburgh and Lake Erie Railroad Company,	Along Beaver river,	Beaver Falls, Beaver county,	December 22d.

Pittsburgh and Lake Erie Railroad Company,	Along Beaver river,	Beaver Falls, Beaver county,	December 22d.
Pittsburgh and Lake Erie Railroad Company,	Along Beaver river,	Beaver Falls, Beaver county,	December 22d.
Pittsburgh and Lake Erie Railroad Company,	Along Beaver river,	Near Fallston, Beaver county,	December 22d.
Pittsburgh and Lake Erie Railroad Company,	Along Beaver river,	Near College, Beaver county,	December 22d.
Porter township supervisors, Clarion county,	Leatherwood creek,	7 miles northwest of New Bethlehem,	July 7th.
Porter township supervisors, Clarion county,	Leasure run,	2½ miles north of New Bethlehem,	July 7th.
Porter township supervisors, Clarion county,	Fiddlers run,	4½ miles east of Rimersburg,	July 30th.
Providence township supervisors, Lancaster county,	Book run,	2 miles east of New Providence,	June 23d.
Rose township supervisors, Jefferson county,	Coder run,	4 miles southwest of Brookville,	July 30th.
Rose township supervisors, Jefferson county,	Beaver run,	Near Conifer,	December 1st.
Rosetraver township supervisors, Westmoreland county,	Cedar creek,	2 miles above mouth,	May 21st.
Rutland township supervisors, Tioga county,	Unnamed stream,	2 miles north of Roseville,	August 27th.
Rutland township supervisors, Tioga county,	Unnamed stream,	2½ miles north of Roseville,	August 27th.
Rutland township supervisors, Tioga county,	Bailey creek,	3 miles west of Roseville,	September 10th.
Rutland township supervisors, Tioga county,	Bailey creek,	3½ miles west of Roseville,	September 10th.
Savan Coal Company,	Little Mahoning creek,	Between Canoe and Grant townships, Indiana county,	August 13th.
Schuylkill county commissioners,	Little Catawissa creek,	Hart's Dam, Union township,	June 23d.
Scranton, city of,	Roaring brook,	Between Scranton and Dunmore,	August 13th.
Scranton, city of,	Roaring brook,	So. Washington avenue, Scranton,	August 13th.
Scranton, city of,	Leggett's creek,	4,000 feet above mouth, Scranton,	August 13th.
Scranton Gas and Water Company,	Roaring brook,	Dunmore, Lackawanna county,	August 13th.
Scranton Gas and Water Company,	Roaring brook,	Webster avenue, Scranton,	August 13th.
Scranton Gas and Water Company,	Roaring brook,	Above South Washington avenue, Scranton,	September 10th.
Sewickley township supervisors, Westmoreland county,	Little Sewickley creek,	Herminie,	August 13th.
Shippensburg, borough of,	Means run,	Shippensburg, West Garfield street,	July 16th.
Shippensburg, borough of,	Means run,	Shippensburg, West Burd street,	December 1st.
Shippensburg, borough of,	Means run, tributary of,	Shippensburg, West Orange street,	December 1st.
Smith township supervisors, Washington county,	Fulton run,	¼ mile north of Burgettstown,	July 16th.
Snowden, C. L.,	Dunlap creek,	Brownsville, Fayette county,	October 16th.
Somerset county commissioners,	Stony creek,	Hooversville,	February 4th.
Somerset county commissioners,	Tub Mill run,	Brothers Valley,	June 11th.
Somerset county commissioners,	Powder run,	Southampton township,	June 11th.
Somerset county commissioners,	Oven run,	Shade township,	June 23d.
Somerset county commissioners,	Flaugherty run,	Meyersdale,	July 7th.
Somerset county commissioners,	Quemahoning creek,	Lincoln township,	July 16th.
Somerset county commissioners,	Roaring fork,	Paint township,	July 16th.
Somerset township supervisors, Somerset county,	Unnamed stream,	Near Somerset,	September 26th.
South Buffalo township supervisors, Armstrong county,	Little Pine run,	6 miles northeast of Freeport,	August 13th.
Southern Cambria Railway Company,	Rager run,	1 mile southeast of Nanty-Glo, Cambria county,	July 16th.
Southern Cambria Railway Company,	Pergrin run,	Nanty-Glo, Cambria county,	July 16th.
Southern Cambria Railway Company,	Stewart's run,	2 miles southeast of Nanty-Glo, Cambria county,	July 16th.
Southern Cambria Railway Company,	James run,	3½ miles southeast of Nanty-Glo, Cambria county,	July 16th.
Spring township supervisors, Crawford county,	Haynes run,	Haynes Hollow,	August 27th.
Swatara township commissioners, Dauphin county,	Unnamed stream,	Near Enhaut,	September 10th.
Taylor township supervisors, Blair county,	Plum creek,	2 miles southeast of Roaring Springs,	August 13th.
Tioga county commissioners,	Cowanesque river,	Tompkins,	July 30th.
Tioga county commissioners,	Salt Spring run,	1 mile south of East Point,	July 30th.
Tioga county commissioners,	Correy creek,	Mainsburg,	July 30th.
Towensing township supervisors, Carbon county,	Pine run,	1 mile above mouth,	October 16th.
Troy township supervisors, Bradford county,	Mud creek,	200 feet above mouth,	September 10th.
Turtle Creek, borough of,	Thompson's run,	Turtle Creek, Allegheny county,	December 1st.
Turtle Creek and Allegheny River Railroad Company,	Thompson's run,	Turtle Creek, Allegheny county,	December 22d.
Tyadaghton Lodge,	Pine creek,	3 miles north of Ansonia, Tioga county,	July 7th.
Uniontown Radial Street Railway Company,	Redstone creek,	Uniontown, Fayette county,	July 7th.
Unity township supervisors, Westmoreland county,	Monastery run,	2 miles southwest of Latrobe,	September 10th.

BRIDGES.—Continued.

Applicant.	Stream.	Location.	Date Approved.
Unity township supervisors, Westmoreland county,	Whitney creek,	Near Whitney,	September 10th.
Upper Paxton township supervisors, Dauphin county,	Little Wiconisco creek,	7 miles above mouth,	September 26th.
Upper Milford township supervisors, Lehigh county,	Indian creek,	Faust School House,	October 16th.
Upper Nazareth township supervisors, Northampton county.	East Branch Monocacy creek,	½ mile northeast of Bath,	November 12th.
Warren township supervisors, Bradford county,	Allyn creek,	1 mile west of Warren Centre,	August 13th.
Warren township supervisors, Bradford county,	Fox creek,	Near Warren Centre,	September 10th.
Warren township supervisors, Bradford county,	General Pendleton creek,	Near South Warren,	September 10th.
Washington county commissioners,	Barr's run,	1 mile southwest of Zollersville,	April 16th.
Washington county commissioners,	Branch of Peters creek,	Finleyville,	July 7th.
Washington township supervisors, Erie county,	Little Conneautte creek,	4.5 miles east of Edinboro,	August 13th.
Washington township supervisors, Berks county,	N. E. Branch Perkiomen creek,	Near Bally,	November 12th.
Waterford township supervisors, Erie county,	Jackson run,	3 miles from Waterford,	August 13th.
Wellsboro, borough of,	Morris creek,	Wellsboro, Tioga county,	September 10th.
Wellsboro, borough of,	Kelsey creek,	Wellsboro, Tioga county, Central avenue,	September 10th.
Wellsboro, borough of,	Kelsey creek,	Wellsboro, Tioga county, Queen street,	September 10th.
Westinghouse Electric and Manufacturing Company,	Turtle creek,	East Pittsburgh, Allegheny county,	June 11th.
West Mahoning township supervisors, Indiana county,	McKees run,	Near North Point,	July 7th.
West Mahoning township supervisors, Indiana county,	Kippert's run,	½ mile south of Vallers,	August 27th.
West Side Electric Street Railway Company,	North Branch Maple creek,	2 miles west of Charlerol, Washington county,	May 14th.
West Side Electric Street Railway Company,	North Branch Maple creek,	Near Charlerol, Washington county,	May 21st.
Wilkes-Barre Connecting Railroad Company,	North Branch Susquehanna river,	Wilkes-Barre,	June 23d.
Wyoming county commissioners,	South Branch Tunkhannock creek,	Factoryville,	July 7th.
Wyoming county commissioners,	Bowman's creek,	Near Bowman's Creek Corners,	July 7th.
Wyoming county commissioners,	Schoonover creek,	Near Lockville,	July 30th.
Wyoming county commissioners,	Lithia Valley creek,	Near Factoryville,	August 13th.
Whitemarsh township supervisors, Montgomery county,	Sandy run,	1,000 feet southwest of Camp Hill,	August 27th.
York county commissioners,	Shrewsbury Branch Codorus creek,	Seitzland,	July 30th.
York county commissioners,	South Branch Muddy creek,	Groves Mill,	July 30th.
York county commissioners,	Fishing creek,	Near Woodbine,	July 30th.
York county commissioners,	West Branch Codorus creek,	Near Graybill,	July 30th.
York county commissioners,	Cabin creek,	1 mile below Margaretta Furnace,	July 30th.
York county commissioners,	Manhattan creek,	Mt. Wolf,	August 13th.
York county commissioners,	Conewago creek,	Near York Haven,	August 13th.
Youghiogheny Pittsburgh Coal Company,	Pigeon creek,	Van Voorhis, Washington county,	September 10th.

FILLS.

Allegheny Plate Glass Company,	Allegheny river,	Glassmere, Allegheny county,	July 16th.
Baltimore and Ohio Railroad Company,	Casselman river,	Between Rockwood and Garrett, Somerset county,	January 20th.
Cambria Steel Company,	Little Conemaugh river,	Near Conemaugh, Cambria county,	December 1st.
Courtney Fire Brick Company,	Monongahela river,	Courtney, Washington county,	July 30th.
Harrisburg, city of,	Susquehanna river,	Harrisburg,	September 26th.
Hubbard and Company,	Allegheny river,	Pittsburgh,	February 19th.
Lehigh Valley Railroad Company,	Lehigh river,	Packerton, Carbon county,	June 23d.
Macbeth-Evans Glass Company,	Monongahela river,	Charleroi, Washington county,	August 13th.
Mathers Brothers,	Shenango river,	Greenville, Mercer county,	February 4th.
Monongahela River Consolidated Coal and Coke Co.,	Monongahela river,	Between Huston Run and Courtney, Washington county,	August 13th.
Monongahela River Consolidated Coal and Coke Co.,	Monongahela river,	Between Monongahela City and Black Diamond, Washington county.	August 13th.
N. G. P., Companies "A" and "K," Fourth Brigade,	Codorus creek,	York,	November 12th.
National Lead and Oil Company,	Allegheny river,	Parnassus, Westmoreland county,	August 13th.
National Stone Company,	Neshannock creek,	New Castle, Lawrence county,	December 1st.
National Transit Company,	Allegheny river,	Oil City,	February 26th.
Pennsylvania Company, The,	Beaver river,	Near West Rochester, Beaver county,	July 30th.
Pennsylvania Company, The,	Beaver river,	Near Moravia, Lawrence county,	October 16th.
Pennsylvania Coal and Coke Company,	Moshannon creek,	Morris township, Clearfield county,	February 26th.
Pennsylvania Railroad Company,	Kiskiminetas river,	Park township, Armstrong county,	March 7th.
Pennsylvania Railroad Company,	Allegheny river,	Near Wood Hill, Venango county,	March 19th.
Pennsylvania Railroad Company,	Kiskiminetas river,	Boll township, Westmoreland county,	March 19th.
Pennsylvania Railroad Company,	Allegheny river,	Near East Brady, Clarion county and Wood Hill and Kennerdell, Venango county.	April 7th.
Pennsylvania Railroad Company,	Allegheny river,	East Brady, Clarion county,	April 16th.
Pennsylvania Railroad Company,	Allegheny river,	Sedgwick, Venango county,	June 11th.
Pennsylvania Railroad Company,	Allegheny river,	South of Brandon, Venango county,	June 23d.
Pennsylvania Railroad Company,	Allegheny river,	Near Dotter, Venango county,	June 23d.
Pennsylvania Railroad Company,	Allegheny river,	Between Neal and Ore Hill, Armstrong county,	June 23d.
Pennsylvania Railroad Company,	Allegheny river,	Mouth of Mahoning creek,	June 23d.
Pennsylvania Railroad Company,	West Branch Susquehanna river,	Curwensville, Clearfield county,	August 27th.
Pennsylvania Railroad Company,	Allegheny river,	Between Dotter and Wood Hill, Venango county,	August 27th.
Pennsylvania Railroad Company,	Allegheny river,	Near Edgecliff, Westmoreland county,	September 10th.
Pennsylvania Railroad Company,	Allegheny river,	Penn township, Allegheny county,	November 12th.
Pennsylvania Railroad Company,	Yellow creek,	1 mile above mouth, Indiana county,	November 12th.
Pennsylvania Railroad Company,	Allegheny river,	Etna, Allegheny county,	December 22d.
Phoenix Iron Works Company,	French creek,	Meadville, Crawford county,	July 16th.
Pittsburgh and Lake Erie Railroad Company,	Shenango river,	New Castle, Lawrence county,	April 7th.
Pittsburgh and Lake Erie Railroad Company,	Ohio river,	Between Davis Island and Groveton, Allegheny county,	April 16th.
Pittsburgh and Lake Erie Railroad Company,	Ohio river,	McKees Rocks, Allegheny county,	April 30th.
Pittsburgh and Lake Erie Railroad Company,	Youghiogheny river,	Below Fuller, Fayette county,	June 2d.
Pittsburgh and Lake Erie Railroad Company,	Ohio river,	Below Aliquippa, Beaver county,	June 2d.
Pittsburgh and Lake Erie Railroad Company,	Beaver river,	From Fallston to College, Beaver county,	July 30th.
Pittsburgh and Lake Erie Railroad Company,	Beaver river,	Near Newport, Lawrence county,	September 26th.
Queens Run Fire Brick Company	West Branch Susquehanna river,	Lock Haven, Clinton county,	December 22d.
South Fork Fire Brick Company,	South Fork Little Conemaugh river.	South Fork, Cambria county,	September 10th.
Southern Cambria Railway Company,	South Branch Black Lick creek,	South of Nanty-Glo, Cambria county,	July 16th.
Susquehanna Stone Company,	Susquehanna river,	2 miles south of Dalmatia, Northumberland county,	July 7th.
Valley Camp Coal Company,	Allegheny river,	Near Valley Camp, Westmoreland county,	December 1st.

MISCELLANEOUS.

Applicant.	Stream.	Nature of Encroachment.	Location.	Date Approved.
Alexander, L. R., and McCullough, N. C.,	Sullivan run,	Wall,	Butler, Butler county,	December 10th.
Allegheny county commissioners,	Pine creek,	Channel change,	South of Mt. Royal, Shaler township,	July 16th.
Anthony, Emiline,	Little Conemaugh river,	Building,	Franklin, Cambria county,	November 12th.
Blean, Mary, and Tobin, Catherine,	Thompson's run,	Building,	Turtle Creek Allegheny county,	October 16th.
Brokenstraw township supervisors, et. al., Warren county.	Brokenstraw creek,	Dyke,	Near Irvineton,	November 12th.
Butler, borough of,	Connoquenessing creek,	Concrete pedestal,	Butler, Butler county,	October 16th.
Central Railroad Company of New Jersey,	Lackawanna river,	Wall,	Scranton,	February 26th.
Chambersburg, borough of,	Falling Spring run,	Intake,	Chambersburg, Franklin county,	January 2d.
Chartiers Southern Railway Company	Daniel's run,	Channel change,	5.2 miles from mouth, Washington county,	September 10th.
Chartiers Southern Railway Company	Daniel's run,	Channel change,	5.5 miles from mouth, Washington county,	September 10th.
Chartiers Southern Railway Company	Daniel's run,	Channel change,	0.8 miles from mouth, Washington county,	September 10th.
Chartiers Southern Railway Company	Little Chartiers creek,	Channel change,	2.7 miles south of Eighty-Four, Washington county.	September 10th.
Chester county commissioners,	Brandywine creek,	Abandon bridge,	Coatesville,	June 2d.
Clinton township supervisors, Venango county,	Big Scrubgrass creek,	Channel change,	Near Clintonville,	September 26th.
Clymer Water Company,	Two Lick creek,	Wall,	¼ miles above mouth, Indiana county,	July 30th.
Concrete Products Company of Pittsburgh,	Ohio river,	Dock,	Neville Island, Allegheny county,	May 14th.
Crucible Coal Company,	Ohio river,	Ice breaker,	Singer Landing, Allegheny county,	June 23d.
Crucible Steel Company,	Allegheny river,	Ice breaker,	51st street, Pittsburgh,	June 23d.
Diamond Water Company,	Stony Cabin creek,	Dyke,	Near Hazleton, Luzerne county,	September 26th.
Easton and Western Railroad Company,	Unnamed stream,	Wall and channel change,	Near Hopesville, Northampton county,	June 23d.
Erie, city of,	Mill creek,	Concrete covering,	Erie,	November 12th.
Erie Railroad Company,	Roaring brook,	Cribbing,	Dunmore, Lackawanna county,	August 27th.
Fetterman, George K.,	Mahoning creek,	Wall,	Punxsutawney, Jefferson county,	June 23d.
Ford City, borough of,	Fort run,	Dyke,	Ford City, Armstrong county,	April 16th.
Fort Pitt Malleable Iron Company,	Chartiers creek,	Cribbing and pipe,	McKees Rocks, Allegheny county,	July 16th.
Friedman, Morris,	Redstone creek,	Foundation walls,	Uniontown, Fayette county,	February 4th.
Hager, John K.,	Falling Spring run,	Pavilion,	Chambersburg, Franklin county,	March 19th.
Hall & Bielski,	Thompson's run,	Channel change,	Patton township, Allegheny county,	December 10th.
Harrisburg Light and Power Company,	Susquehanna river,	Pier,	Harrisburg,	May 21st.
Herrick, Cordello,	Mill creek,	Concrete covering,	Erie,	Oqtober 16th.
Hey, Richard & Company,	Schuylkill river,	Wall,	Manayunk, Philadelphia,	April 30th.
Home Water Company,	Schuylkill river,	Pipe line,	Royersford, Montgomery county,	September 10th.
Jones & Laughlin Steel Company,	Monongahela river,	Wall,	Pittsburgh,	July 30th.
Koos, Emile,	French creek,	Remove material from,	Franklin, Venango county,	July 30th.
McGuigan, Thomas,	French creek,	Remove material from,	Meadville, Crawford county,	May 14th.
Monongahela River Consolidated Coal and Coke Company.	Monongahela river,	Coal hoist,	Pittsburgh,	February 19th.
Monongahela River Consolidated Coal and Coke Company.	Monongahela river,	Coal tipple,	Black Diamond, Washington county,	August 13th.

Montour Railroad Company,	McPherson's run,	Channel change,	Washington county,	February 19th.
New Castle, city of,	Neshannock creek,	Wall,	New Castle, Lawrence county,	July 7th.
N. Y. C. & H. R. Railroad Company,	Cush creek,	Channel change,	Hooverhurst, Indiana county,	June 11th.
Nixon Paper Company, Martin and Wm. H.,	Schuylkill river,	Building,	Manayunk, Philadelphia,	July 7th.
Pennsylvania Railroad Company,	Turtle creek,	Pipe lines,	Pitcairn, Allegheny county,	January 20th.
Pennsylvania Railroad Company,	Oil creek,	Channel change,	Spartansburg, Crawford county,	January 20th.
Pennsylvania Railroad Company,	Big Sewickley creek,	Channel change,	Milbel, Westmoreland county,	April 7th.
Pennsylvania Railroad Company,	Turtle creek,	Channel change,	Wilmerding, Allegheny county,	July 7th.
Pennsylvania Railroad Company,	Conemaugh river,	Coffer dam,	Summerhill, Cambria county,	August 27th.
Pennsylvania Railroad Company,	Conemaugh river,	Coffer dam,	Derry township, Westmoreland county,	August 27th.
Pennsylvania Railroad Company,	Big Sandy run,	Channel change,	Near Snoe Shoe, Centre county,	October 16th.
Pennsylvania Water Company,	Turtle creek,	Pipe line,	East Pittsburgh, Allegheny county,	October 16th.
Philadelphia and Reading Railway Company,	Little Schuylkill river,	Channel change,	Tamaqua, Schuylkill county,	September 26th.
Phillips Gas and Oil Company, T. W.,	Allegheny river,	Pipe line,	1.2 miles north of Rimerton, Armstrong county.	August 13th.
Phillips Gas and Oil Company, T. W.,	Allegheny river,	Pipe line,	Near mouth of Mahoning creek, Armstrong county.	August 13th.
Pittsburgh and Lake Erie Railroad Company,	Along Beaver river,	Subway stairway and passenger platform.	Beaver Falls, Beaver county,	December 22d.
Pittsburgh, Chartiers and Youghiogheny Railway Company.	Little Chartiers creek,	Channel change,	0.6 miles north of Eighty-Four, Washington county.	August 13th.
Pittsburgh, Chartiers and Youghiogheny Railway Company.	Chartiers creek,	Channel change,	Peters township, Washington county,	September 26th.
Pittsburgh, Chartiers and Youghiogheny Railway Company.	Little Chartiers creek,	Channel change,	Near Eighty-Four, Washington county,	September 26th.
Pittsburgh Coal Company,	Brush run,	Coal tipple,	Peters township, Washington county,	August 27th.
Pittsburgh Plate Glass Company,	Allegheny river,	Dyke,	Ford City, Armstroug county,	February 19th.
Pittsburgh Railways Company,	Unnamed stream,	C. I. Culvert,	West View, Allegheny county,	September 26th.
Sharon, borough of, et. al.,	Shenango river,	Wall,	Sharon, Mercer county,	August 13th.
Temple Club, The,	Neshannock creek,	Wall,	New Castle, Lawrence county,	August 27th.
Trenton, Bristol and Philadelphia Street Railway Company.	Neshaminy creek,	Wharf,	Bridgewater, Bucks county,	June 11th.
Venango Sand and Stone Company,	Allegheny river,	Pump house,	Near Kennerdell, Venango county,	October 16th.
West Leechburg Steel Company,	Kiskiminetas river,	River well,	Leechburg, Armstrong county,	March 19th.
West Side Electric Street Railway Company,	No. Branch Maple creek,	Channel change,	Fallowfield township, Washington county,	June 2d.
West Side Electric Street Railway Company,	No. Branch Maple creek,	Channel change,	Fallowfield township, Washington county,	June 11th.
West Virginia Pulp and Paper Company,	Bald Eagle creek,	Wall,	Tyrone, Blair county,	August 13th.
York, city of,	Codorus creek and Willis run.	Channel change,	York, York county,	November 12th.

CHAPTER 5.

CONTRACT NO. 6.

DIKE CONSTRUCTION IN FALLS TOWNSHIP, BUCKS COUNTY.

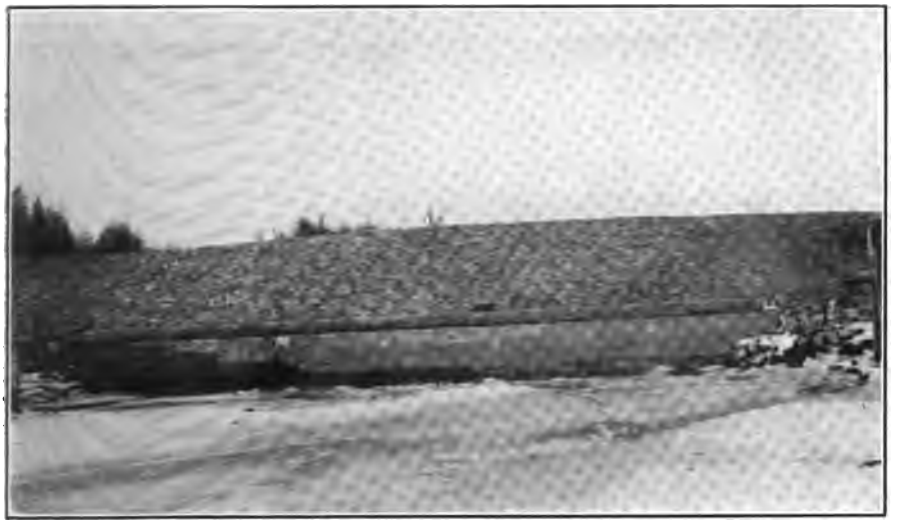
An Act, approved June 14, 1911, for "the completion of a dike or dikes for the protection of property adjacent to the Delaware River, in Falls Township, Bucks County," appropriated $5,000 for this work, which contemplated completing two dikes at the mouths of small creeks at the Delaware River, left incomplete in 1908 on account of the exhaustion of a former appropriation. Plans and estimates showed that this sum was insufficient to finish the work in a permanent manner, and in 1913 the further sum of $10,000 was appropriated by the Act of July 25th.

Plans and specifications were prepared under these two appropriations, and on July 1, 1914, a contract was entered into for the work, which was started immediately and finished at the end of the year.

Many years ago dikes were built along this section of the Delaware River to protect fertile farm lands from tidal overflow and from inundation during floods. At crossings of small tributaries, flumes with tide flap gates were placed, by which creek water could pass out at low tide, while river water was not admitted. Some of these flumes and the earth embankments over and adjacent thereto were subsequently washed out, and these appropriations were made to replace them. The two breaches, for the repair of which these appropriations were made, were each approximately fifty feet wide and have been closed by two parallel, concrete, gravity section retaining walls approximately thirty-two feet apart, carried one-half foot above mean high tide. Between the walls an earth embankment was placed, rising above flood level and paved with hand laid rip-rap.

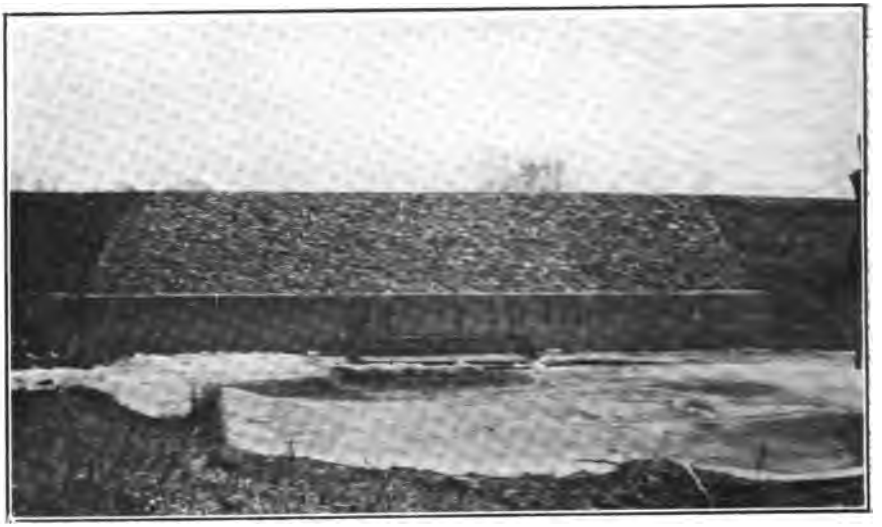
Through the embankment and walls at the lower breach two 48 inch cast iron pipes, closed at the river end with timber tide gates, permit creek water to pass out at low tide but exclude river water from the tributary stream. At the upper breach one 48 inch cast iron pipe with flap gate fulfills similar functions. The work was all done between substantial cofferdams and progressed slowly, but was carefully and thoroughly executed under the constant daily inspection of a representative of the Commission.

The contract was let on a unit price basis to the lowest of four bidders. Its total cost was $11,114.10, exclusive of engineering, inspection, advertisement of proposals and office expense, which amounted to $1,691.41.



Contract No. 6.
River Side of Upper Breach as Completed

Contract No. 6
Creek Side Upper Breach as Completed.



Contract No. 6.

Creek Side of Lower Break as Completed

Since completion the dikes and gates have accomplished the purpose intended and benefit results to the owners of the farms on the lowlands adjacent to the creeks.

Attention is called to the recommendation in the 1913 report concerning the manner of making appropriations for work of this kind. The fact that three different appropriations were necessary to complete a satisfactory piece of work at this point is illustrative of the matter therein referred to, namely, that such appropriations should not be made until surveys and estimates of cost have been secured, to show in a trustworthy manner what amount should be made available, and when this has been determined the Legislature should either appropriate the sum recommended, or the whole should be refused. The State Departments and Commissions should not be expected to undertake difficult construction work and complete it satisfactorily with insufficient funds, and, doubtless, this often leads to greater cost than if the requisite amount was placed at their disposal originally.

CHAPTER 6.

SANDY CREEK INVESTIGATION.

This investigation was prompted through a desire to relieve the Borough of Sandy Lake, Mercer County, from periodic inundation from Sandy Creek and from the outlet of Sandy Lake, which streams unite at the lower end of the town. Although attention was confined largely to this point, examinations and surveys covered the entire streams.

It is possible to protect Sandy Lake Borough from a repetition of flood damage either by the erection of walls and dikes around portions of the borough or by controlling Sandy Creek by the construction of a large reservoir above the town so as to ameliorate future freshets.

The former method is least expensive but will benefit the borough only, while the latter will relieve local trouble, improve the stream throughout its course, increase the value of existing or unused water power sites, and assist moderately in flood regulation in the Allegheny River.

The Commission's engineers estimate that the protection of Sandy Lake Borough by dikes and walls would cost approximately $24,000, exclusive of property damage, while the sum appropriated is $10,000,

but the Act provides: "that no part of the money hereby appropriated shall become available until satisfactory evidence be furnished the Auditor General that the county or counties, municipality or municipalities, immediately affected or benefited by said improvement shall furnish sufficient money to complete the project." After conferring with reference to raising the additional $14,000 necessary, representatives of the borough advise the Commission that $2,000 or $3,000 is all that can be raised locally for this improvement.

Any method for the improvement of flood conditions at Sandy Lake Borough less efficacious than those suggested would be of a temporary nature, and would not adequately provide the protection required.

Sandy Lake Borough, a small agricultural community of 639 population, is unfortunately situated at the confluence of two streams where inundation often occurs, and at the point where a steep section of the channel meets a relatively flat one, causing slackening of the current which makes the stream overflow the low country. The business part of the town and the flats adjoining are often inundated, but there is high ground within the borough some of which is now occupied by dwellings, upon which both residential and business portions of the town should have been built.

The regulation of Sandy Creek by the construction of a large reservoir a short distance above Sandy Lake Borough would accomplish the desired result at the borough and effect control of the stream, but as the valley is little inhabited, the saving from flood damage would be small, and the flow of the creek is not used for domestic or industrial supply and only to a small extent for power.

RECOMMENDATIONS.

The State is not responsible for the flood damage in Sandy Lake Borough and should aid, if at all, only to a limited extent in improving the conditions, and the Commission does not recommend any further appropriations by the State, unless it is desired to take up the larger project of reservoir control. Until the water inventory has demonstrated the value of the water power which would result and the assistance which would be rendered in controlling conditions on the Allegheny River, further assistance from the State is not warranted.

DESCRIPTION OF SANDY CREEK.

Sandy Creek, which drains at its mouth 159 square miles of Crawford, Mercer and Venango counties, rises at an elevation of 1,350 feet above sea level in southern Crawford County, following a generally southeasterly course to its confluence with the Allegheny River

9 miles below Franklin. It has an extreme length of 36 miles and its basin is composed of rolling hills and broad valleys.

The upper portion, which lies in the glacial area, abounds in marshes and swamps with several large lakes and ponds. Its course is sinuous, particularly where it traverses swampy or marshy areas, while for the lower 13 miles most of the valley is narrow, high, steep hills rising 400 to 500 feet on either bank.

The slope in the extreme upper portion is steep but from Williams Corner to Reeds Furnace, 17 miles, it is flat, averaging only about 2½ feet per mile, from which point to the mouth 13½ miles, the slope steepens to 17 feet per mile. The largest tributary is South Sandy Creek, others of less importance being Little Sandy Creek, Nicholson Run, Victor Run and Sandy Lake Outlet.

The watershed is comparatively sparsely inhabited and is devoted largely to agriculture, although coal, oil and gas are found thereon. The largest towns are Polk, population 2,066; Sandy Lake, 639; Raymilton, 105; and Stoneboro, 1,074, which is on Sandy Lake. The creek is followed from its mouth to Sandy Lake, 18 miles, by the Lake Shore and Michigan Southern Railroad.

Immediately above Sandy Lake Borough is a water-power operating a grist mill, with an installed capacity of 75 H. P. under a head of 16 feet, with a gas engine auxiliary of 35 H. P. capacity. The only other operating water-power on the stream is one mile above Polk, where a grist mill operates under 11½ feet head with an equipment of 65 H. P. capacity, without an auxiliary.

Formerly there were three other power developments all on the lower 13 miles, but they have been abandoned. These were at Reeds Furnace, Raymilton and Mays Mills.

At Reeds Furnace, power has been utilized for many years. The most recent development built about ten years ago to operate under 12.5 feet head, but which was not put in service, was for the generation of electric current to run oil well pumps.

The plant at Raymilton was a grist mill operated by an overshot wheel under 8 feet head, while that at Mays Mills, which was washed out in 1906, operated under 6 to 8 feet head with a 20 H. P. gas engine auxiliary.

Taken as a whole, flood damage in the valley of Sandy Creek is small, practically the only trouble being experienced at Sandy Lake Borough. The borough of Polk lies on high ground and is not damaged, and the Lake Shore & Michigan Southern Railroad tracks, except at few points, are out of reach of floods. The extensive flats below Sandy Lake and below Polk are submerged occasionally when the creek overflows but, as there are few buildings thereon and these areas are little cultivated, slight damage results.

We are advised that high water damages Sandy Lake Borough almost annually, the flood of March, 1913, being the greatest of which record was obtained. During this flood the business district comprising two blocks along Main Street, was submerged to a maximum depth of two feet, while the cellars of the residences on the side streets in this section were filled with water and the streets themselves inundated. The damage at Sandy Lake Borough is not great in proportion to population, as compared with that done by floods in some other communities.

STORAGE RESERVOIR.

A favorable dam site to create a storage reservoir is 1.3 miles above Sandy Lake Borough, beyond which point the drainage area is 53 square miles. This could be utilized to alleviate flood damage, to improve the existing powers, to offer opportunity for the more complete power development of this stream, and to supply water for such other industries as might locate in this valley. A dam impounding water to a maximum depth of 42 feet could be built with a length on the crest of 555 feet.

With spill-way crest at elevation 1210 above sea level, the reservoir, when full, would submerge 5 square miles, the pool extending 12 miles up the stream and having a capacity of 2,700,000,000 cubic feet, or 20,250,000,000 gallons.. Such a reservoir would correspond, per unit of tributary drainage area, closely to the proposed Pymatuning Swamp Reservoir in capacity and regulating effect, and would cost probably about the same per million cubic feet of stored water, which would demand an outlay for this reservoir of approximately $600,000.

The total fall from the top of this dam to the Allegheny River at the creek mouth approximates 280 feet, of which a considerable portion might be used for power. The heads utilized by the developments on the stream of which there is record and that which is possible at the suggested dam, amount to 97 feet. A larger total fall could be developed by improving other sites or by increasing the head at some of those enumerated so that at least 150 feet could be developed. With the reservoir in operation a minimum flow could be assured through the lower section of the creek of approximately 100 second-feet, which if applied under 150 feet of head would permit of the development of approximately 1,300 twenty-four hour power, or 3,100 ten-hour power, and in addition, considerable secondary power.

There are several more or less extensive areas of valley low lands, one near Polk and the other below Sandy Lake Borough, which, if floods were controlled, may offer favorable manufacturing sites, whose value would be much increased by the high minimum flow which the reservoir would maintain in the stream.

Downstream from Lake St. Bridge over Sandy Creek
Sandy Lake Borough.

Upstream from Lake St. Bridge over Sandy Creek.
Sandy Lake Borough

Water Powers on Sandy Creek.

LOCAL PROTECTION FOR SANDY LAKE BOROUGH BY WALLS AND DIKES.

It was formerly believed that adequate permanent relief might be effected in Sandy Lake Borough by dredging and straightening the channel of the main creek and Sandy Lake outlet, but surveys show that backwater from the creek would pass up Sandy Lake outlet in times of flood and submerge the town, notwithstanding such improvement, so that in order to effect real protection it is necessary to construct walls and dikes.

Along the upper end of the borough the river banks are high until College Street is reached, from which point dikes should be built along the west bank of the creek across Lacock to Main Street. From Lake Street to the knoll immediately south, it would be necessary to construct a wall because of high velocities in the stream and the sharp bend therein. From the southwest side of the knoll a dike would be required running southwesterly to the bridge over Sandy Lake outlet on Main Street. Both approaches to this bridge would have to be raised and a dike constructed from that point northwest following Sandy Lake outlet across a marshy area to a point on Lake Street opposite the public school house. Where this dike crosses Walnut Street the bridge and approaches would have to be raised.

In order to deflect the drainage from the hillside to the north above the town, a ditch should be dug from the intersection of Broad and Walnut Streets in a generally southwesterly direction to pass around the northwesterly end of the dike at the school-house, and drainage ditches should also be dug along the north side of Lake Street from the school-house to Walnut Street and thence down the west side of Walnut Street, discharging into the creek through a pipe with a flap gate on the outlet end. Drainage ditches would also be necessary along the inside toe of the dikes.

The elevation of high water in the flood of March, 1913, was, as near as can be determined, 1158.5 feet above sea level at the Lake Street bridge, and approximately 1158 feet in the town. Therefore the dike should be at this height and it has been designed to extend to elevation 1160. The top width would be 6 feet, with side slopes of 2 on 1, the outside face being protected by stone slope paving where exposed to high velocities. The plan contemplates a total length of 2200 feet of dike and 310 feet of concrete retaining walls.

The improvements at the Main Street Bridge, over Sandy Lake outlet, would be costly owing to the fact that it would be necessary to remove the recently laid brick pavement for 80 feet on the south side and 125 feet on the north side. As the top of the proposed dike would be 2.2 feet above the present bridge floor, the bridge would be raised and in order to retain the sidewalks at their present elevation concrete retaining walls would have to be built on either side of the highway.

Because houses would interfere with the construction of an earth dike, for a short distance to the west of Main Street, it will be necessary to construct 92 feet of concrete wall at this point and a concrete connection with the dike, all as shown on the plan.

ESTIMATE.

The cost of this work has been estimated from designs and surveys, as follows:

Earth dike,	$8,597.00
Main and Walnut Street crossings and raising abutments,	7,756.00
Rip-rap on earth dike,	628.00
Excavation of drainage ditches,	425.00
Pipe culverts,	200.00
Repaving Main Street,	2,620.00
A total of	$20,226.00
To this should be added for contingencies, engineering and inspection, 17½ per cent., or,	3,540.00
Total,	$23,766.00

CHAPTER 7.

HYDROGRAPHIC DIVISION.

INTRODUCTION.

Stream gaging was begun by this Commission in 1907 by taking over from the U. S. Geological Survey, which discontinued its work in Pennsylvania, stations on the Allegheny, Kiskiminitas, Youghiogheny, Casselman, West Branch Susquehanna, North Branch Susquehanna, Susquehanna and Juniata rivers, together with Black Lick and Laurel Hill creeks. Since February, 1908, this work has developed and expanded in conformity with an increasing demand for its results and has been augmented since 1913 when the Flood Warning Act was passed, requiring the establishment of additional stations, together with other legislation necessitating a more extensive knowledge of stream flow. The Commission's gaging stations are shown, by drainage basins, in Tables Nos. 13 to 16 starting at the headwaters and proceeding down stream.

TABLE NO. 13.

Gaging Stations in the Delaware Basin.

Delaware River at Port Jervis, N. Y., Riegelsville, N. J. and *Lambertville, N. J.	East Branch Delaware River, at Fish Eddy, N. Y.	
	*East Branch Delaware River, at Hancock, N. Y.	
	West Branch Delaware River, at Hale Eddy, N. Y.	
	*West Branch Delaware River, at Hancock, N. Y.	
	Lackawaxen River, at Hawley, Pa.,	Wallenpaupack Creek, at Wilsonville, Pa.
	Lackawaxen River, at Rowlands, Pa.,	
	*Shohola Creek, at Lords Valley, Pa.,	Rattlesnake Brook, at Spring Brook, Pa.
	Big Bushkill Creek, at Shoemakers, Pa.	
	*Brodheads Creek, at Analomink, Pa.,	Analomink Creek, at Henryville, Pa.,
		*McMichaels Creek, at Stroudsburg, Pa., — Pocono Creek, near Stroudsburg, Pa.
		McMichaels Creek, near Stroudsburg, Pa.,
	Lehigh River, at Tannery, Pa.	
	Lehigh River, at Bethlehem, Pa.	
	*Tohickon Creek, at Point Pleasant, Pa.	
	*Neshaminy Creek, near Rushland, Pa.	
	Schuylkill River, at Schuylkill Haven, Pa.,	Little Schuylkill River, at Molino, Pa.
	Schuylkill River, at Reading, Pa.,	*Perkiomen Creek, at Frederick (Spring Mount), Pa
	Schuylkill River, at Conshohocken, Pa.,	Perkiomen Creek, at Graters Ford, Pa.
	*Schuylkill River, at Fairmount Dam, Philadelphia, Pa.,	*Wissahickon Creek, near Philadelphia, Pa.
	Darby Creek, at Lansdowne, Pa.	
	Brandywine Creek, at Chadds Ford, Pa.	

*Station discontinued.

TABLE NO. 14.

Gaging Stations in the Susquehanna Basin.

Susquehanna River at Selins Grove, Pa., .. Harrisburg, Pa. and *McCalls Ferry, Pa., ..

- **North Branch Susquehanna River at Conklin, N. Y.**
  - Chenango River, at Chenango Forks, N. Y.
  - *Chenango River, at Binghamton, N. Y.
  - Chemung River, at Chemung, N. Y.
  - Towanda Creek, at Monroeton, Pa.
  - Wyalusing Creek, at Wyalusing, Pa.
  - Mehoopany Creek, near Mehoopany, Pa.
  - Tunkhannock Creek, at Dixon, Pa.
  - Bowman Creek, at Eatonville, Pa.
  - *Lackawanna River, at Scranton, Pa.
  - Lackawanna River, at Moosic, Pa.
  - Fishing Creek, at Bloomsburg, Pa.
- ***Binghamton, N. Y.**
- **Towanda, Pa.**
- **Wilkes-Barre, Pa. and Danville, Pa.**
- **West Branch Susquehanna River at Bower, Pa.**
  - Chest Creek, at St. Lu, Pa.
  - Clearfield Creek, at Dimeling, Pa.
  - Moshannon Creek, at Winburne, Pa.
  - Driftwood Branch Sinnemahoning Creek, at Sterling Run, Pa.
  - Kettle Creek, at Leidy, Pa.
  - Bald Eagle Creek, at Milesburg, Pa. / Bald Eagle Creek, at Beech Creek, Pa. → Spring Creek, near Bellefonte, Pa.
  - Pine Creek, at Waterville, Pa.
  - Lycoming Creek, near Trout Run, Pa.
  - *Lycoming Creek, at Bridge No. 2, near Williamsport, Pa.
  - *Loyalsock Creek, at Forksville, Pa.
  - Buffalo Creek, near Lewisburg, Pa.
- **Clearfield, Pa.**
- **Renovo, Pa.**
- **Williamsport, Pa.**
- ***Allenwood, Pa. and Lewisburg, Pa.**
- **Juniata River at Newport, Pa.**
  - Frankstown Branch Juniata River, at Huntingdon, Pa.
  - Raystown Branch Juniata River, at Saxton, Pa.
  - Kishacoquillas Creek, at Kulps, Pa.
  - Tuscarora Creek, near Port Royal, Pa.
- **Conodoquinet Creek, at Brysons Bridge, Cumberland Co., Pa.**
- **Yellow Breeches Creek, at Olmsteds Mill, Cumberland Co., Pa.**
- **Big Swatara Creek, at Jonestown, Pa.**
- ***Octoraro Creek, at Rowlandsville, Md.**
- ***Deer Creek, at Churchville, Md.**

*Station discontinued.

TABLE NO. 15.

Gaging Stations in the Potomac Basin

- Potomac River.
  - *Wills Creek, at Cumberland, Md.
  - Evitts Creek, below Evitts, Pa.
  - *Antietam Creek, near Sharpsburg, Md. — Little Antietam Creek. — *West Br. Little Antietam Creek at Mont Alto, Pa.
  - Monocacy River, near Frederick, Md.

*Station discontinued.

TABLE NO. 16.

Gaging Stations in the Ohio Basin.

- Ohio River.
  - Allegheny River at Red House, N. Y. and Kittanning, Pa.
    - Kinzua Creek at Dewdrop, Pa.
    - Conewango Creek at Frewsburg, N. Y.
    - Brokenstraw Creek at Youngsville, Pa.
    - Tionesta Creek at Butler Bridge, Pa.
    - Oil Creek at Rouseville, Pa.
    - French Creek at Carlton, Pa. — North Branch French Creek at Kimmeytown, Pa.; Cussewago Creek near Meadville, Pa.; Sugar Creek at Wyattville, Pa.
    - Sandy Creek at Sandy Lake, Pa.
    - Clarion River at Clarion, Pa.
    - Red Bank Creek at St. Charles, Pa.
    - Mahoning Creek at Furnace Bridge (Dee), Pa.
    - Crooked Creek at Hilemans Farm, Armstrong Co., Pa.
    - Kiskiminitas River at Avonmore (Conemaugh River). — Stony Creek at Johnstown, Pa. — *Quemahoning Creek at Stantons Mill, Pa.; *Mill Creek at Ben's Creek, Pa.; Black Lick Creek at Black Lick, Pa.; *Loyalhanna Creek near New Alexandria, Pa.
  - Monongahela River.
    - Tygart River at Fetterman, W. Va.
    - West Fork River at Enterprise, W. Va.
    - Cheat River near Morgantown, W. Va.
    - Dunkard Creek at "Bobtown," Greene Co., Pa.
    - Youghiogheny River at *Friendsville, Md., Confluence and Connellsville, Pa. — Casselman River at Markleton and *Confluence. — Laurel Hill Creek at Ursina and *Confluence.
    - Turtle Creek at Trafford City and East Pittsburgh. — Brush Creek near Trafford City.
  - Beaver River.
    - Shenango River at Turnerville, Sharon and New Castle, Pa. — Little Shenango River at Salem, Pa. and Greenville, Pa.; Pymatuning Creek at Orangeville, Pa.; Neshannock Creek at East Brook and New Castle, Pa.
    - Mahoning River at *Youngstown, O., and Lawrence Junction, Pa.
    - *Connoquenessing Creek at Walkers Mill, Pa. — Slippery Rock Creek at Wurtemberg, Pa.

*Station discontinued.

USE OF DATA.

The importance of stream flow data is illustrated in the activity displayed by other countries, states and private enterprises in establishing and operating comprehensive systems of stream gaging. Among the hydraulic problems in Pennsylvania requiring stream flow data for their solution are the regulation of the sewage and wastes discharged by communities or industries into rivers and streams, the study and design of water supply, water power and flood prevention projects, navigation, flood warning and bridge design. The information available consists of gage heights and measured discharges of streams, drainage areas at designated points, descriptions of factors influencing flow in certain localities, cross sectional areas of streams, velocities of currents, etc.

CHANGE OF YEAR.

Previous to 1914, it was the custom for computations of stream flow to extend from January to December, inclusive; it has been decided, however, to change the ending of the stream gaging year from December 31 to September 30, because:

1. In Pennsylvania the draft period usually ends and the storage period begins about the end of September, as shown in a representative manner by the flow for a long period of years of the Susquehanna River at Harrisburg, where the drainage area is 24,100 square miles, a section equal to 53 per cent. of the total area of the State.

2. By completing the computations before the end of the calendar year the annual reports can be published and distributed earlier.

3. The annual computations of the records can be completed in December which will give opportunity for securing a large number of measurements of stream flow under ice cover. These measurements will furnish exceptionally valuable information since the flow of the streams during frozen periods is an uncertain quantity, requiring approximations of the probable discharge from climatological records and from the flow of streams having similar physical characteristics.

4. The semi-annual gage inspection trips can be made during periods when discharge measurements can always be made and when levels can be run to ascertain the slope of the water surface at each gaging station in order to secure further data for the determination of the coefficient of roughness. A knowledge of this coefficient is essential in calculations necessary for action on applications for the construction of bridges and other encroachments as well as being of importance in other engineering studies.

5. It is in accord with the practice of the U. S. Geological Survey and it is desirable that there should be conformity in the method pursued by the two organizations.

NEW STREAM GAGING STATIONS.

Between January 1st and September 30th, 1914, 23 new gaging stations were established as shown in Table No. 17.

TABLE NO. 17.

Stream Gaging Stations Established Between January 1 and September 30, 1914.

Stream.	Location.
North Branch Susquehanna River,	Towanda.
Towanda Creek,	Monroeton.
Mehoopany Creek,	Mehoopany.
Tunkhannock Creek,	Dixon.
Bowman Creek,	Eatonville.
Fishing Creek,	Bloomsburg.
Lackawaxen River,	Rowlands.
Lehigh River,	Tannery.
Schuylkill River,	Schuylkill Haven.
Little Schuylkill River,	Molino.
Schuylkill River,	Reading.
Perkiomen Creek,	Graters Ford.
Schuylkill River,	Conshohocken.
Driftwood Branch, Sinnemahoning Creek,*	Driftwood.
Sinnemahoning Creek,*	Sinnemahoning.
Susquehanna River,*	Selinsgrove.
Susquehanna River,†	Dam at Harrisburg.
Brush Creek,	Trafford City.
Turtle Creek,	Trafford City.
Little Shenango River,	Greenville.
Pymatuning Creek.	Orangeville.
Neshannock Creek,	Eastbrook.
Mahoning River,	Lawrence Junction.

*These stations were established to aid in predicting floods and only gage heights are observed at these points.

†This station is used in conjunction with the Harrisburg gage at Walnut street to give the slope of the river and will prove of special value in determining the roughness coefficient in Kutter's formula for all stages of the river.

The Commission receives reports from 107 gaging stations, of which 12 are operated by the U. S. Geological Survey in neighboring states on streams bordering on or entering Pennsylvania and 95 are operated by the Commission. Of these stations, 21 are in the Delaware, 43 in the Susquehanna, 1 in the Potomac and 42 in the Ohio basins, all of which are listed in tables Nos. 18 to 21, together with references to all hydrographic data available in the Water Supply Commission Reports.

TABLE

HYDROGRAPHIC DATA AVAILABLE IN WATER

Delaware

Stream.	Location.	Established.	Discontinued.	Re-established.
Analomink Creek,	Henryville, Pa.,	Sept. 16, 1908,		
Big Bushkill Creek,	Shoemakers, Pa.,	Sept. 19, 1908,		
Brandywine Creek,	Chadds Ford, Pa.,	Aug. 1, 1911,		
Brodheads Creek,	Analomink, Pa.,	Sept. 17, 1908,	Oct. 13, 1913,	
Darby Creek,	Lansdowne, Pa.,	July 31, 1911,		
Delaware River,	Lambertville, N. J.,	July 22, 1897,	April 1, 1908,	
Delaware River,	Port Jervis, N. Y.,	Oct. 12, 1904,		
Delaware River,	Riegelsville, N. J.,	July 3, 1906,		
East Branch Delaware River.	Fish Eddy, N. Y.,	Nov. 19, 1912,		
East Branch Delaware River.	Hancock, N. Y.,	Oct. 14, 1902,	Dec. 31, 1912,	
Lackawaxen River,	Hawley, Pa.,	July 12, 1908,		
Lackawaxen River,	Rowlands, Pa.,	June 4, 1914,		
Lehigh River,	Bethlehem, Pa.,	Sept. 22, 1902,	Feb. 13, 1905,	April 26, 1909,
Lehigh River,	Tannery, Pa.,	June 23, 1914,		
Little Schuylkill River,	Molino, Pa.,	May 7, 1914,		
McMichaels Creek,	Stroudsburg, Pa.,	Sept. 16, 1908,	July 16, 1910,	
McMichaels Creek,	Near Stroudsburg, Pa.,	Aug. 3, 1911,		
Neshaminy Creek,	Rushland, Pa.,	June 10, 1884,	Dec. 31, 1912,	
Perkiomen Creek,	Frederick (Spring Mount), Pa.	Aug. 20, 1884,	Dec. 31, 1912,	
Perkiomen Creek,	Graters Ford, Pa.,	June 11, 1914,		
Pocono Creek,	Near Stroudsburg, Pa.,	Aug. 3, 1911,		
Rattlesnake Brook,	Spring Brook, Pa.,	Sept. 22, 1911,		
Schuylkill River,	Conshohocken, Pa.,	June 8, 1914,		
Schuylkill River,	Philadelphia, Pa.,	Jan. 1, 1903,	Dec. 31, 1912,	
Schuylkill River,	Reading, Pa.,	May 6, 1914,		

NO. 18.

SUPPLY COMMISSION OF PENNSYLVANIA REPORTS.

Basin.

Data in 1910-11 Report.	Data in 1912 Report.	Data in 1913 Report.	Data in 1914 Report.
Discharge from Sept. 16, 1908, to Dec. 31, 1911.	.....	Discharge msmts. 1912-13; discharge Feb. 17-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge from Sept. 19, 1908, to Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge msmts. 1908-12; gage heights Aug. 1-Dec. 31, 1911.	Discharge msmts. 1912-13; gage heights Jan. 1-Dec. 31, 1912.	Discharge measmts.; gage heights Jan. 1-Dec. 31, 1913.	Discharge msmts. and gage heights Jan. 1-Sept. 30, 1914.
Discharge msmts. Sept., 1908-1911; gage heights Dec. 10, 1908-Dec. 31, 1911.	Discharge msmts and gage heights Jan. 1-Dec. 31, 1912.	Discharge msmts. and gage heights Jan. 1-Oct. 13, 1913.	.....
Discharge msmts. 1911-12; gage heights July 31-Dec. 31, 1911.	Discharge msmts. 1912-13; gage heights Jan. 1-Dec. 31, 1912.	Discharge msmts. and gage heights Jan. 1-Dec. 31, 1913.	Discharge msmts. and gage heights Jan. 1-Sept. 30, 1914.
Discharge msmts. July, 1897-Sept., 1908; gage heights July 23, 1897-May 31, 1908; monthly discharge July, 1897-Dec., 1902.	.....	.....	.....
Discharge msmts. 1902-11; discharge Oct. 13, 1904-Dec. 31, 1911.	Discharge msmts. 1912-13; discharge Jan. 1-Dec. 31, 1912.	Discharge msmts. and gage heights Jan. 1-Dec. 31, 1913.	Discharge Jan. 1, 1913-Sept. 30, 1914.
Discharge July 3, 1906-Dec. 31, 1911.	Discharge msmts. 1913; discharge Jan. 1-Dec. 31, 1912.	Discharge msmts. and gage heights Jan. 1-Dec. 31, 1913.	Discharge msmts. 1914; discharge Jan. 1, 1913-Sept. 30, 1914.
.....	.....	Discharge Nov. 19, 1912-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge msmts. 1902-1911; daily discharge 1910-1911; monthly discharge Oct., 1902-Dec., 1911.	Discharge Jan. 1-Dec. 31, 1912.	.....	.....
Discharge July 2, 1908-Dec. 31, 1911.	Discharge msmts. 1913; discharge Jan. 1-Dec. 31, 1912.	.....	Discharge Jan. 1-July 31, 1913; Oct. 1, 1913-Sept. 30, 1914.
.....	.....	.....	Discharge msmts. and gage heights June 4-Sept. 30, 1914.
Discharge Sept. 22, 1902-Feb. 13, 1905; April 26, 1909-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
.....	.....	.....	Discharge msmts. and gage heights June 24-Sept. 30, 1914.
.....	.....	.....	Discharge msmts. and gage heights May 7-Sept. 30, 1914.
Discharge Sept. 16, 1908-July 16, 1910.	.....	.....	.....
Discharge msmts. and gage heights Aug. 10-Dec. 31, 1911.	Discharge msmts and gage heights Jan. 1-Dec. 31, 1912.	Discharge msmts. 1913; discharge Aug. 10, 1911-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge June 10, 1884-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	.....	.....
Discharge Aug. 20, 1884-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	.....	.....
.....	.....	.....	Discharge msmts. and gage heights June 11-Sept. 30, 1914.
Discharge msmts. and gage heights Aug. 10-Dec. 31, 1911.	Discharge msmts. and gage heights Jan. 1-Dec. 31, 1912.	Discharge msmts. 1913; discharge Aug. 10, 1911-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge msmts. and gage heights Sept. 22-Dec. 31, 1911.	Discharge msmts. 1912-13; gage heights Jan. 1-Dec. 31, 1912.	Discharge msmts. and gage heights Jan. 1-Dec. 31, 1913.	Discharge msmts. and gage heights Jan. 1-Sept. 30, 1914.
.....	.....	.....	Discharge msmts. and gage heights June 8-Sept. 30, 1914.
Discharge Jan. 1, 1903-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	.....	.....
.....	.....	.....	Discharge May 6-Sept. 30, 1914.

TABLE NO. 18.

Stream.	Location.	Established.	Discontinued.	Re-established.
Schuylkill River, ...	Schuylkill Haven, Pa.,	May 7, 1914,	.....	.....
Shohola Creek, ...	Lords Valley, Pa., ...	Sept. 22, 1911,	Aug. 9, 1913,	.....
Tohickon Creek, ...	Point Pleasant, Pa., ..	Sept. 13, 1888,	Dec. 31, 1912,	.....
Wallenpaupack Creek, ...	Wilsonville, Pa., ...	July 8, 1908,	.....	.....
West Branch Delaware River.	Hale Eddy, N. Y., ...	Nov. 15, 1912,	.....	.....
West Branch Delaware River.	Hancock, N. Y., ...	Oct. 15, 1902,	Dec. 31, 1912,	.....
Wissahickon Creek, ...	Philadelphia, Pa., ...	May 5, 1897,	June 5, 1899, Mar. 9, 1901, May 22, 1902, Oct. 5, 1903. July 31, 1906,	July 1, 1900. Aug. 1, 1901, Nov. 1, 1902. Jan. 1, 1905.

—Continued.

Data in 1910-11 Report.	Data in 1912 Report.	Data in 1913 Report.	Data in 1914 Report.
.....	.....	.....	Discharge msmts. and gage heights May 7-Sept. 30, 1914.
Discharge msmts and gage heights Sept. 22-Dec. 31, 1911.	Discharge msmts. and gage heights Jan. 1-Dec. 31, 1912.	Discharge msmts. and gage heights Jan. 1-Aug. 9, 1913.	.....
Discharge Sept. 13, 1883-Dec. 31, 1911, except daily for 1900.	Discharge Jan. 1-Dec. 31, 1912.	.....	.....
Discharge msmts 1908-1912; gage heights for portions of 1909-10-11.	Discharge msmts. and gage heights Jan. 1-Dec. 31, 1912.	Discharge msmts. 1912-13; gage heights Jan. 1-June 30, Oct. 1-Dec. 31, 1913.	Discharge msmts. 1914, discharge tables Jan. 1, 1912-Sept. 30, 1914, monthly discharge for periods Jan. 1, 1912-Sept. 30, 1914.
.....	.....	Discharge Nov. 15, 1912-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge msmts. 1902-11; daily discharge 1910-11; monthly discharge Oct., 1902-1911.	Discharge Jan. 1-Dec. 31, 1912.	.....	.....
Discharge May 5, 1897-June 5, 1899. July 1, 1900-Mar. 9, 1901, Aug. 1, 1901-May 22, 1902, Nov. 1, 1902-Oct. 5, 1903, Jan. 1, 1905-July 31, 1906.	.....	.....	.....

TABLE

HYDROGRAPHIC DATA AVAILABLE IN WATER

Susquehanna

Stream.	Location.	Established.	Discontinued.	Re-established.
Bald Eagle Creek,	Beech Creek, Pa.,	June 23, 1910,		
Bald Eagle Creek,	Milesburg, Pa.,	Feb. 6, 1911,		
Bowman Creek,	Eatonville, Pa.,	Jan. 23, 1914,		
Buffalo Creek,	Lewisburg, Pa.,	Sept. 8, 1913,		
Chemung River,	Chemung, N. Y.,	Sept. 7, 1903,		
Chest Creek,	St. Lu, Pa.,	Oct. 2, 1913,		
Chenango River,	Binghamton, N. Y.,	July 31, 1901,	Dec. 31, 1911,	
Chenango River,	Chenango Forks, N. Y.,	Nov. 11, 1912,		
Clearfield Creek,	Dimeling, Pa.,	Oct. 2, 1913,		
Conodoguinet Creek,	Hogestown, Pa.,	Sept. 26, 1911,		
Deer Creek,	Churchville, Md.,	Dec. 14, 1904,	Mar. 31, 1909,	
Driftwood Branch Sinnemahoning Creek.	Sterling Run, Pa.,	Sept. 30, 1913,		
Fishing Creek,	Bloomsburg, Pa.,	Jan. 27, 1914,		
Frankstown Branch Juniata River.	Huntingdon, Pa.,	May 1, 1895,		
Juniata River,	Newport, Pa.,	Mar. 21, 1899,	July 14, 1906,	Jan. 7, 1907,
Kettle Creek,	Leidy, Pa.,	Dec. 2, 1913,		
Kishacoquillas Creek,	Kulps, Pa.,	Aug. 21, 1911,		
Lackawanna River,	Moosic, Pa.,	Aug. 8, 1913,		
Lackawanna River,	Scranton, Pa.,	July 1, 1903,	Sept. 16, 1911, July 30, 1913.	Feb. 2, 1912,
Loyalsock Creek,	Forksville, Pa.,	July 17, 1908,	Dec. 1, 1913,	
Lycoming Creek,	Trout Run, Pa.,	Dec. 4, 1913,		
Lycoming Creek,	Near Williamsport, Pa.,	July 14, 1903,	Nov. 19, 1913,	
Mehoopany Creek,	Mehoopany, Pa.,	Jan. 29, 1914,		
Moshannon Creek,	Winburne, Pa.,	Oct. 4, 1913,		

NO. 19.

SUPPLY COMMISSION OF PENNSYLVANIA REPORTS.

Basin.

Data in 1910-11 Report.	Data in 1912 Report.	Data in 1913 Report.	Data in 1914 Report.
Discharge msmts. 1910-1912; gage heights June 24, 1910-Dec. 31, 1911.	Discharge msmts. 1913, gage heights Jan. 1-Dec. 31, 1912.	Discharge msmts. 1913; discharge June 24, 1910-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge msmts. 1910-1912; discharge Feb. 6, 1911-Dec. 31, 1911.	Discharge msmts. 1913, discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
.....	.....	.....	Discharge msmts. and gage heights Jan. 28-Sept. 30, 1914.
.....	.....	Discharge msmts. and gage heights Sept. 8-Dec. 31, 1913.	Discharge msmts. and gage heights Jan. 1-Sept. 30, 1914.
Discharge Sept. 7, 1908-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge msmts. and gage heights Jan. 1-Sept. 30, 1914.
.....	.....	Discharge msmts. and gage heights Oct. 2-Dec. 31, 1913.	Discharge msmts. and gage heights Jan. 1-Sept. 30, 1914.
Discharge Aug. 1, 1901-Dec. 31, 1911.	Discharge msmts. 1912,	.....	.....
.....	.....	Discharge msmts. 1913; gage heights Nov. 11, 1912-Dec. 31, 1913.	Discharge msmts. 1914; discharge Nov. 11, 1912-Sept. 30, 1914.
.....	.....	Discharge msmts. and gage heights Oct. 2-Dec. 31, 1913.	Discharge msmts. and gage heights Jan. 1-Sept. 30, 1914.
Discharge msmts. 1911-1912, discharge Sept. 26-Dec. 31, 1911.	Discharge msmts. 1912-1913; discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge msmts. 1904-1906; discharge Jan. 1, 1905-Mar. 31, 1909.	.....	.....	.....
.....	.....	Discharge msmts. and gage heights Sept. 30-Dec. 31, 1913.	Discharge msmts. and gage heights Jan. 1-Sept. 30, 1914.
.....	.....	.....	Discharge msmts. and gage heights Jan. 27-Sept. 30, 1914.
Discharge msmts. 1907-1912; discharge May 1, 1895-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge msmts. 1899-1912; discharge Mar. 21, 1899-July 14, 1906, Jan. 7, 1907-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
.....	.....	Discharge msmts. and gage heights from Dec. 2-31, 1913.	Discharge msmts. and gage heights Jan. 1-Sept. 30, 1914.
Discharge msmts. 1911-1912; discharge Aug. 21-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
.....	.....	Discharge msmts. and gage heights Aug. 8-Dec. 31, 1913.	Discharge msmts. and gage heights Jan. 1-Sept. 30, 1914.
Discharge msmts. 1908-1912; discharge July 1, 1908-Sept. 16, 1911.	Discharge msmts. 1913 and 1912 discharge table.	Discharge Jan. 1-July 30, 1913.	.....
Discharge msmts. and gage heights July 17, 1908-Dec. 31, 1911.	Gage heights Jan. 1-Dec. 31, 1912.	Discharge msmts. and gage heights Jan. 1-Dec. 1, 1913.	.....
.....	.....	Discharge msmts. and gage heights Dec. 4-Dec. 31, 1913.	Discharge msmts. and gage heights Jan. 1-Sept. 30, 1914.
Discharge msmts. 1908-1912; discharge July 14, 1908-Dec. 31, 1911.	Discharge msmts. 1913: discharge Jan. 1-Dec. 31, 1912.	See miscellaneous discharge msmts.	.....
.....	.....	.....	Discharge msmts. and gage heights Jan. 29-Sept. 30, 1914.
.....	.....	Discharge msmts. and gage heights Oct. 4-Dec. 31, 1913.	Discharge msmts. and gage heights Jan. 1-Sept. 30, 1914.

TABLE NO.

Stream.	Location.	Established.	Discontinued.	Re-established.
North Branch Susquehanna River.	Binghamton, N. Y., ...	July 31, 1901.	Dec. 31, 1912.	.....
North Branch Susquehanna River.	Conklin, N. Y., ...	Nov. 13, 1912.	.....	.....
North Branch Susquehanna River.	Danville, Pa., ...	Mar. 25, 1899.	Mar. 9, 1904.	Mar. 24, 1905.
North Branch Susquehanna River.	Towanda, Pa., ...	Jan. 29, 1914.	.....	.....
North Branch Susquehanna River.	Wilkes-Barre, Pa., ...	Mar. 30, 1899.	.....	.....
Octoraro Creek, ...	Rowlandsville, Md., ...	Nov. 21, 1896.	Sept. 30, 1899.	.....
Pine Creek, ...	Waterville, Pa., ...	July 15, 1908.	.....	.....
Raystown Branch Juniata River.	Saxton, Pa., ...	Aug. 31, 1911.	.....	.....
Spring Creek, ...	Bellefonte, Pa., ...	Feb. 7, 1911.	.....	.....
Susquehanna River, ...	Harrisburg, Pa., ...	Jan. 1, 1891.	.....	.....
Susquehanna River, ...	McCall Ferry, Pa., ...	May 17, 1902.	Dec. 31, 1909.	.....
Susquehanna River, ...	Selinsgrove, Pa., ...	Mar. 19, 1914.	.....	.....
Swatara (Big) Creek, ...	Jonestown, Pa., ...	Nov. 19, 1910.	.....	.....
Towanda Creek, ...	Monroeton, Pa., ...	Jan. 30, 1914.	.....	.....
Tunkhannock Creek, ...	Dixon, Pa., ...	Jan. 28, 1914.	.....	.....
Tuscarora Creek, ...	Port Royal, Pa., ...	Aug. 21, 1911.	.....	.....
West Branch Susquehanna River.	Allenwood, Pa., ...	Mar. 25, 1899.	April 5, 1902.	.....
West Branch Susquehanna River.	Bower, Pa., ...	Oct. 2, 1913.	.....	.....
West Branch Susquehanna River.	Clearfield, Pa., ...	Oct. 2, 1913.	.....	.....
West Branch Susquehanna River.	Lewisburg, Pa., ...	Sept. 21, 1913.	.....	.....
West Branch Susquehanna River.	Renovo, Pa., ...	Jan. 1, 1908.	.....	.....
West Branch Susquehanna River.	Williamsport, Pa., ...	Mar. 1, 1895.	.....	.....
Wyalusing Creek, ...	Wyalusing, Pa., ...	Oct. 28, 1908.	.....	.....
Yellow Breeches Creek, ..	Olmsteds Mill, Pa., ...	Mar. 22, 1909.	Oct. 31, 1909.	Jan. 26, 1910.

19.—Continued.

Data in 1910-11 Report.	Data in 1912 Report.	Data in 1913 Report.	Data in 1914 Report.
Discharge July 31, 1901-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	.....	.....
.....	.....	Discharge msmts. 1912-13; discharge Nov. 13, 1912-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1911.
Discharge msmts. 1899-1912; discharge Mar. 26, 1899-Dec. 31, 1903, Mar. 23, 1905-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
.....	.....	.....	Discharge msmts. and gage heights Jan. 29-Sept. 30, 1914.
Discharge msmts. 1899-1912; discharge Mar. 30, 1899-Dec. 31, 1911.	Discharge msmts. 1913; discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge Nov. 21, 1896-Sept. 30, 1899.	.....	.....	.....
Discharge msmts. 1908-1912; discharge July 15, 1908-Dec. 31, 1911.	Discharge msmts. 1913; discharge Jan. 1-Dec 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge msmts. 1911-1912; gage heights Aug. 31-Dec. 31, 1911.	Discharge msmts. and gage heights Jan. 1-Dec. 31, 1912.	Discharge msmts. and gage heights Jan. 1-Dec. 31, 1913.	Discharge msmts. 1914; discharge Aug. 31, 1911-Sept. 30, 1914.
Discharge msmts. 1911-1912; discharge Feb. 7-Dec. 31, 1911.	Discharge msmts. 1913; discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge Jan. 1, 1891-Dec. 31, 1911.	Discharge msmt. 1913; discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge June 1, 1902-Dec. 31, 1909.	.....	.....	.....
.....	.....	.....	Gage heights Mar. 19-Sept. 30, 1914.
Discharge msmts. 1908-1912; discharge Nov. 21, 1910-Dec. 31, 1911.	Discharge msmts. 1912-1913; discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
.....	.....	.....	Discharge msmts. and gage heights Jan. 30-Sept. 30, 1914.
.....	.....	.....	Discharge msmts. and gage heights Jan. 28-Sept. 30, 1914.
Discharge msmts. 1911-1912; discharge Aug. 21-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge Mar. 23, 1899-April 5, 1902.	.....	.....	.....
.....	.....	Discharge msmts. and gage heights Oct. 2-Dec. 31, 1913.	Discharge msmts. 1914; discharge Oct. 2, 1913-Sept. 30, 1914.
.....	.....	Gage heights Oct. 2-Dec. 31, 1913.	Gage heights Jan. 1-Sept. 30, 1914.
.....	.....	Gage heights Sept. 21-Dec. 31, 1913.	Gage heights Jan. 1-Sept. 30, 1914.
Discharge msmts. 1908-1912; discharge Jan. 1, 1908-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge msmts. 1901-1912; discharge Mar. 1, 1897-Dec. 31, 1911.	Discharge msmts. 1913; discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge msmts. 1908-1912; discharge Dec. 1-31, 1908, June 1, 1909-Dec. 31, 1911.	Discharge msmts. 1913; discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge msmts. 1908-1912; discharge Mar. 23-Oct. 31, 1909, Jan. 22, 1910-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept 30, 1914.

TABLE

HYDROGRAPHIC DATA AVAILABLE IN WATER

Potomac

Stream.	Location.	Established.	Discontinued.	Re-established.
Antietam Creek, ...	Sharpsburg, Md., ...	June 24, 1897.	Aug. 26, 1905.	.....
Monocacy River, ...	Frederick, Md., ...	Aug. 4, 1896.	.....	.....
West Br. Little Antietam Creek.	Mont Alto, Pa., ...	May 1, 1909.	Dec. 20, 1912.	.....
Wills Creek, ...	Cumberland, Md., ...	May 5, 1905.	July 14, 1906.	.....

TABLE

HYDROGRAPHIC DATA AVAILABLE IN WATER

Ohio

Stream.	Location.	Established.	Discontinued.	Re-established.
Allegheny River, ...	Kittanning, Pa., ...	Aug. 13, 1904.	.....	.....
Allegheny River, ...	Red House, N. Y., ...	Sept. 4, 1903.	.....	.....
Black Lick Creek, ...	Black Lick, Pa., ...	Aug. 16, 1904.	.....	.....
Brokenstraw Creek, ...	Youngsville, Pa., ...	Oct. 22, 1909.	.....	.....
Brush Creek, ...	Trafford City, Pa., ...	July 14, 1914.	.....	.....
Casselman River, ...	Confluence, Pa., ...	Sept. 15, 1904.	Aug. 11, 1913.	.....
Casselman River, ...	Markleton, Pa., ...	Aug. 25, 1913.	.....	.....
Cheat River, ...	Morgantown, W. Va.,...	July 8, 1899.	Dec. 30, 1899. Dec. 29, 1900. Dec. 31, 1905.	July 1, 1900. Aug. 21, 1902. Nov. 18, 1908.
Clarion River, ...	Clarion, Pa., ...	Nov. 22, 1909.	.....	.....
Conewango Creek, ...	Frewsburg, N. Y., ...	Oct. 25, 1909.	.....	.....
Crooked Creek, ...	Hilemans Farm, Pa., ..	Oct. 16, 1909.	.....	.....
Cussewago Creek, ...	Meadville, Pa., ...	May 2, 1910.	.....	.....
Dunkard Creek, ...	"Bobtown," Greene Co.	Oct. 14, 1909.	.....	.....

NO. 20.

SUPPLY COMMISSION OF PENNSYLVANIA REPORTS.

Basin.

Data in 1910-11 Report.	Data in 1912 Report.	Data in 1913 Report.	Data in 1914 Report.
Discharge July 1, 1897-Jan. 23, 1904, July 12, 1904-Aug. 25, 1905.	.....	.....	.....
Discharge Aug. 4, 1896-Dec. 31, 1911.	Discharge msmts. 1913; discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge msmts. 1913; discharge Jan. 1, 1912-Sept. 30, 1914.
Discharge May 1, 1909-Dec. 15, 1911.	Discharge Jan. 3-Dec. 20, 1912.	.....	.....
Discharge May 5, 1905, July 14, 1906.	.....	.....	.....

NO. 21.

SUPPLY COMMISSION OF PENNSYLVANIA REPORTS.

Basin.

Data in 1910-11 Report.	Data in 1912 Report.	Data in 1913 Report.	Data in 1914 Report.
Discharge Aug. 25, 1904-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge Sept. 4, 1903-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge msmts. 1904-1912; discharge Aug. 17, 1904-Dec. 31, 1911.	Discharge msmts. 1912-1913; discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge msmts. 1908-1912; discharge Nov. 1, 1909-Dec. 31, 1911.	Discharge msmts. 1913; discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
.....	.....	.....	Discharge msmts. and gage heights July 14-Sept. 30, 1914.
Discharge Sept. 15, 1904-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Aug. 11, 1913.	.....
.....	.....	Discharge msmts. and gage heights Aug. 25-Dec. 31, 1913.	Discharge msmts. and gage heights June 13-Sept. 30, 1914.
Discharge msmts. 1899-1911; discharge July 8-Dec. 31, 1899, July 1-Dec. 31, 1900, Aug. 11, 1902-Dec. 31, 1905, Nov. 18, 1908-Dec. 31, 1911.	Discharge msmts 1911-1913; discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Sept. 30, 1913.	Discharge Oct. 1, 1913-Sept. 30, 1914.
Discharge msmts. 1908-1912; discharge Nov. 22, 1909-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge msmts. 1910-1912; gage heights Nov. 1, 1909-Dec. 31, 1911.	Discharge msmts. and gage heights Jan. 1-Dec. 31, 1912.	Gage heights Jan. 1-Dec. 31, 1913.	Discharge msmts. and gage heights Jan. 1-Sept. 30, 1914.
Discharge msmts. 1910-1912; discharge Oct. 16, 1909-Dec. 31, 1911.	Discharge msmts. 1913; discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-July 11, Aug. 11-Sept. 30, 1914.
Discharge May 3, 1910-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge msmts. 1909-1911; gage heights Oct. 14, 1909-Dec. 31, 1911.	Discharge msmts. and gage heights Jan. 1-Dec. 31, 1912.	Discharge msmts.; gage heights Jan. 1-Dec. 31, 1913.	Discharge msmts. and gage heights Jan. 1-Sept. 30, 1914.

TABLE NO.

Stream.	Location.	Established.	Discontinued.	Re-established.
French Creek,	Carlton, Pa.,	April 29, 1908,		
Kinsua Creek,	Dewdrop, Pa.,	Oct. 23, 1909,	Nov. 20, 1911,	July 22, 1912.
Kiskiminitas River,	Avonmore, Pa.,	May 29, 1907,		
Laurel Hill Creek,	Confluence, Pa.,	Sept. 15, 1904,	Aug. 11, 1913,	
Laurel Hill Creek,	Ursina, Pa.,	Aug. 12, 1913,		
Little Shenango River,	Greenville, Pa.,	Jan. 1, 1914,		
Little Shenango River,	Salem, Pa.,	Dec. 19, 1913,		
Loyalhanna Creek,	Below New Alexandria, Pa.	Oct. 7, 1910,	Aug. 17, 1913,	
Mahoning Creek,	Furnace Bridge, Pa.,	Oct. 18, 1909,		
Mahoning River,	Lawrence Junction, Pa.,	Aug. 12, 1914,		
Mahoning River,	Youngstown, Ohio,	May 23, 1903,	July 23, 1906,	
Mill Creek,	Bens Creek, Pa.,	August, 1901,	May 1, 1911,	
Neshannock Creek,	East Brook, Pa.,	Jan. 19, 1914,		
Neshannock Creek,	New Castle, Pa.,	Aug. 9, 1909,		
North Branch French Creek.	Kimmeytown, Pa.,	May 4, 1910,		
Oil Creek,	Rouseville, Pa.,	Oct. 20, 1909,		
Pymatuning Creek,	Orangeville, Pa.,	Jan. 1, 1914,		
Quemahoning Creek,	Stantons Mill, Pa.,	October, 1901,	June, 1910,	
Red Bank Creek,	St. Charles, Pa.,	Oct. 19, 1909,		
Sandy Creek,	Sandy Lake, Pa.,	May 11, 1914,		
Shenango River,	New Castle, Pa.,	Aug. 25, 1912,		
Shenango River,	Sharon, Pa.,	Aug. 1, 1909,		
Shenango River,	Turnerville, Pa.,	Feb. 1, 1912,		
Slippery Rock Creek,	Wurtemburg, Pa.,	Jan. 1, 1912,		
Stony Creek,	Johnstown, Pa.,	June 18, 1913,		
Sugar Creek,	Wyattville, Pa.,	May 6, 1910,		
Tionesta Creek,	Butler Bridge, Pa.,	July 26, 1912,		
Turtle Creek,	East Pittsburgh, Pa.,	Dec. 1, 1907,		
Turtle Creek,	Trafford City, Pa.,	July 28, 1914,		

21.—Continued.

Data in 1910-11 Report.	Data in 1912 Report.	Data in 1913 Report.	Data in 1914 Report.
Discharge msmts. 1908-1912; discharge April 29, 1908-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Aug. 7, 1914; gage heights Aug. 8-Sept. 30, 1914.
Discharge msmts. 1909-1912; discharge Nov. 1, 1909-Nov. 20, 1911.	Discharge msmts. 1913; discharge July 22-Dec. 31, 1912.	Discharge Jan. 1- Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge June 1, 1907-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	Discharge msmts. 1913-14; discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge Sept. 18, 1901-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Aug. 11, 1913.	.....
.....	.....	Discharge msmts. and gage heights Aug. 15-Dec. 31, 1913.	Discharge msmts. and gage heights Jan. 1-Sept. 30, 1914.
.....	.....	.....	Discharge Jan. 1-Sept. 30, 1914.
.....	.....	.....	Discharge msmts. and gage heights Jan. 1-Sept. 30, 1914.
Discharge msmts. 1910-1912; discharge Oct. 7, 1910-Dec. 31, 1911.	Discharge msmts. 1912-13; discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Aug. 14, 1913.	.....
Discharge msmts. 1910-12; discharge table.	Discharge msmts. 1913; discharge table.	.....	Discharge Jan. 1-Sept. 30, 1914.
.....	.....	.....	Discharge msmts. Mar.-Sept., 1914, discharge Aug. 12-Sept. 30, 1914.
Discharge May 24, 1903-July 23, 1906.	.....	.....	.....
Monthly discharge Aug., 1901-April, 1911.	.....	.....	.....
.....	.....	.....	Discharge msmts. and gage heights Jan. 19-Sept. 30, 1914.
Discharge msmts. 1909-12; discharge Aug. 9, 1909-Dec. 31, 1911.	Discharge msmts. 1913; gage heights Jan. 1-Dec. 31, 1912.	Discharge msmts. and gage heights Jan. 1-Dec. 31, 1913.	.....
Discharge msmts. 1910-12; discharge May 16, 1910-Dec. 31, 1911.	Discharge msmts. 1913; discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge msmts. 1908-12; discharge Oct. 20, 1909-Dec. 31, 1911.	Discharge msmts. 1913; discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
.....	.....	.....	Discharge Jan. 1-Sept. 30, 1914.
Monthly discharge Oct., 1901-June, 1910.	.....	.....	.....
Discharge msmts. 1910-12; discharge Oct. 30, 1909-Dec. 31, 1911.	Discharge msmts. 1913; discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
.....	.....	.....	Discharge msmts. and gage heights May 11-Sept. 30, 1914.
.....	.....	.....	Discharge msmts. 1913-14; discharge Jan. 1, 1910-Sept. 30, 1914.
Discharge msmts. 1908-12; discharge Aug. 1, 1909-Dec. 31, 1911.	Discharge msmts. 1913; discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge April 1, 1913-Sept. 30, 1914.
.....	Discharge msmts. 1912-13; discharge Feb. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge msmts. 1914; discharge Oct. 1, 1913-Sept. 30, 1914.
.....	Discharge msmts. 1911-12; discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
.....	.....	.....	Discharge msmts. 1913-14; gage heights Jan. 1-Sept. 30, 1914.
Discharge msmts. 1910-12; discharge May 7, Dec. 31, 1911.	Discharge msmts. 1913; discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
.....	Discharge msmts. 1912-13; gage heights July 26-Dec. 31, 1912.	Gage heights Jan. 1-Dec. 31, 1913.	Discharge msmts. and gage heights Jan. 1-Sept. 30, 1914.
Discharge msmts. 1907-12; discharge Dec. 1, 1907-Dec. 31, 1911.	Discharge msmts. 1912-13; discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
.....	.....	.....	Discharge msmts. and gage heights July 28-Sept. 30, 1914.

TABLE NO.

Stream.	Location.	Established.	Discontinued.	Re-established.
Tygart River, ...	Fetterman, W. Va., ..	June 3, 1907,	.....	.....
West Fork River, ...	Enterprise, W. Va., ..	June 2, 1907,	.....	.....
Youghiogheny River, ...	Confluence, Pa., ...	Sept. 15, 1904,	.....	.....
Youghiogheny River, ...	Connellsville, Pa., ..	July 22, 1908,	.....	.....
Youghiogheny River, ...	Friendsville, Md., ...	Aug. 17, 1898,	Dec. 31, 1904,	.....

21.—Continued.

Data in 1910-11 Report.	Data in 1912 Report.	Data in 1913 Report.	Data in 1914 Report.
Discharge June 3, 1907-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Sept. 30, 1913.	Discharge Oct. 1, 1913-Sept. 30, 1914.
Discharge June 2, 1907-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Sept. 30, 1913.	Discharge Oct. 1, 1913-Sept. 30, 1914.
Discharge Sept. 16, 1904-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge mamts. 1908-12; discharge July 22, 1908-Dec. 31, 1911.	Discharge Jan. 1-Dec. 31, 1912.	Discharge Jan. 1-Dec. 31, 1913.	Discharge Jan. 1-Sept. 30, 1914.
Discharge Aug. 17, 1898 Dec. 31, 1904.	.....	.....	.....

STREAM FLOW CONDITIONS DURING THE YEAR.

The stream flow reports from January to September, 1914, show that the early part of the period was characterized by excessive run-off, while later a heavy deficiency from the normal flow occurred. These conclusions are based on the flow of the Susquehanna River at Harrisburg for 24 years and a ten year record of the Allegheny River at Kittanning; the two stations together controlling 55 per cent. of the State.

The run-off during the first five months was 30 per cent. above the normal in the western part and 17 per cent. in the eastern. The greatest monthly run-off occurred in April when the excess over the normal in the west was 72 per cent. and 75 per cent. in the east.

There were no floods of importance except on the North Branch of the Susquehanna River where a maximum stage of 28.4 feet was reached at Wilkes-Barre on March 29, 1914. The highest recorded stage here is 33.1 feet which occurred March 18, 1865. The maximum flow at Harrisburg for the year occurred on March 30th and was only 68 per cent. of the maximum recorded discharge of June 1st, 1889. During July several sections were visited by cloud-bursts of great intensity, the most noteworthy being on Roaring Brook near Scranton on July 11th when $250,000 damage was done to bridges, railroads, streets, etc.

During the four months of June, July, August and September there was a marked deficiency in run-off, most apparent in western streams, which discharged about 38 per cent. of their normal flow, with the lowest in September when the run-off was about 32 per cent. of the normal. The Susquehanna discharged 56 per cent. of normal for this period: lowest in September when it fell to 46 per cent. During the period of low flow some of the streams attained lower gage heights than ever previously recorded, more particularly in the west as exemplified by Slippery Rock, Brokenstraw and French creeks and the Shenango River. The drought was felt particularly in the northwest by industrial concerns and in the anthracite coal regions in the northeast where communities and industries suffered from water shortage.

Ordinarily, limestone streams draw on subterranean sources of supply during droughts and show much larger rates of flow than streams draining other geological formations. In this drought, while the larger limestone streams were steadily falling, the smaller ones were running at a low but steady flow and closely approached their minimum recorded stages.

SELECTION OF GAGING STATIONS.

The selection of new gaging stations is governed by the magnitude of the river or stream, the possibility of increased development

where the stream is used, and by their application to municipal and commercial water supplies, and storage for navigation or power. In choosing a location for a gage, a reconnaissance is made of the stream, and all bridges in the neighborhood are examined to obtain the one most suitable. Frequent trouble met with in the selection of new gaging stations is the absence of residents in the vicinity of otherwise good stations to read and report the gage heights, and this sometimes determines the final selection, while other requirements are a comparatively smooth, measurable flow and accessibility of the site. If the gage is erected on a bridge, the approaches should be high enough to prevent overflow, there should be a good handrail to which the gage can be attached and the bridge should cross the stream at or as near a right angle with the flow as possible.

The gaging station on Shohola Creek at Lords Valley was discontinued on account of the difficulty in securing observers and the inaccessibility of the station which made it difficult to make meter measurements at gage heights necessary for rating the station. An effort will be made to relocate this gage farther downstream at a more favorable point.

AUTOMATIC GAGE.

A gage which correctly records river stages automatically is much to be desired and, after an unsatisfactory trial with a float type gage, a recording pressure gage has been secured which will be given a thorough test at the gaging station on the Susquehanna River at Harrisburg. This gage consists of a diaphragm exposed on one side to varying pressures corresponding to the fluctuating stages of the river, and on the other side to an air column in a small rubber tube actuating a pointer in the recording apparatus, at the end of which a pen traces on a graduated chart an ink hydrograph of the river stages. This automatic gage has been in operation since October and it will be necessary to try it through varying conditions of climate and river discharge before its efficiency can be determined.

INSPECTION TRIPS.

Each gaging station has been visited at least twice during the year when discharge measurements were taken and the gages, which are mostly of the chain type, leveled from bench marks. During these inspection trips imperfect gages are repaired or replaced and during the summer of 1914, nineteen old gages, shown in Table No. 22, were renewed.

TABLE NO. 22.

Stations Provided With New Gages.

Stream.	Location.
Lackawaxen River,	Hawley.
Analomink Creek,	Henryville.
Bushkill Creek,	Shoemakers.
Lycoming Creek,	Trout Run.
Raystown Branch, Juniata River,	Saxton.
Yellow Breeches Creek,	Olmsteds Mill.
Conewango Creek,	Frewsburg.
Kinzua Creek,	Dewdrop.
Oil Creek,	Rouseville.
North Branch, French Creek,	Kimmeytown.
French Creek,	Carlton.
Allegheny River,	Kittanning.
Crooked Creek,	Hileman's Farm.
Black Lick Creek,	Blacklick.
Kiskiminitas River,	Avonmore.
Loyalhanna Creek,	New Alexandria.
Casselman River,	Markleton.
Laurel Hill Creek,	Ursina.
Youghiogheny River,	Confluence.

From January 1st to September 30th, 73 discharge measurements were made in the Delaware Basin, 164 in the Susquehanna Basin, and 124 in the Ohio Basin, a total of 361 measurements. A large number made in August and September, when the streams were unusually low, have added valuable data to the low flow records, while many measurements were also made during the March floods. The discharge measurements are taken with the meter placed preferably at two-tenths and eight-tenths depths, although the next preference is the six-tenths depth measurement while, during floods, surface measurements are taken. Observations for vertical velocity curves are also made in order to determine the value of the mean velocity coefficient.

CHECKING OBSERVERS.

One class of field work is the inspection of the work of gage readers by a hydrographer visiting the stations and taking a number of gage height readings together with current meter discharge measurements. A record in the office shows the comparison between the inspector's gage heights and those reported by the observers and, in this way, unreliable and careless observers are detected. This has increased efficiency and raised the general standard of the observers' reports.

OFFICE METHODS.

Cards containing reports of daily gage heights are received weekly from each observer while important flood warning stations report

daily. Each observer is provided with a notebook in which he enters the gage height as soon as observed, and this book is returned to the office every four months.

When returning from a trip, the field notes of engineers and hydrographers are copied in books which remain in the office and the field books are filed; the measurements are then computed, checked and the results copied on sheets and plotted on discharge, area and velocity curves; the results of the leveling are written on a sheet known as "notes on gage" from which corrections to the gage heights are tabulated on a sheet called "corrections to gage." Under each station are filed a description of the gaging station, sheet showing how the drainage area was computed, notes on gage, corrections to gage heights, discharge measurement sheet, discharge table, sheets of daily discharge and sheets of monthly discharge.

CURVES.

When the area, velocity and discharge curves are plotted, it is frequently found that changes have occurred in the cross-section of the channel, and the points do not plot on curves which were previously accepted so that it becomes necessary to procure additional data required to change the curve so that it will fit the new conditions. Thirteen discharge curves have been thus revised this year; 6 stations, whose discharges had not been published hitherto, were rated and the results published in this report under Schuylkill River at Reading, Raystown Branch Juniata River at Saxton, Pymatuning Creek at Orangeville, Little Shenango River at Greenville, Shenango River at New Castle and the Mahoning River at Lawrence Junction.

Due to the long time usually required to obtain low, high and medium stage measurements, a number of stations have not been rated so that their discharges cannot be published. Low and medium measurements can be obtained more readily than high ones since high stages occur infrequently and fluctuate rapidly, often preventing hydrographers from securing high measurements. For these reasons and because a large number of stations have been established during the past two years, 7 stations in the Delaware, 14 in the Susquehanna and 11 in the Ohio basin have not been rated. Provisional ratings have been made of some of these stations, but their accuracy is not yet sufficiently assured to warrant publishing discharge. These stations are of comparatively little value until a sufficient number of discharge measurements have been obtained to determine curves of discharge. In order to secure a record showing the dependable yield of the streams and on account of the value of the data, the stations should be maintained indefinitely after they are rated.

There are still some large streams whose flow is not known, as well as hundreds of smaller ones, which are becoming more valuable each year and whose flow should be known. It is necessary and becomes the duty of the State as the conservator of its natural resources to maintain the present gaging system and to extend it in so far as possible over large and small streams. Eight men are engaged on this work including the office and field force, a number inadequate for efficiently prosecuting it on a larger scale.

EXPLANATION OF TERMS.

The volume of water flowing in a stream is expressed in various terms which may be divided into two groups:

(1) Those which represent a rate of flow; as, second-feet, gallons per minute, and run-off in second-feet per square mile, and (2) those which represent the actual quantity of water; as, run-off in depth in inches. The units used in this series of reports are second-feet, second feet per square mile and run-off in inches.

"Second-feet" is an abbreviation for cubic foot per second and is the unit for the rate of discharge of water in a stream 1 foot wide, 1 foot deep, flowing 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the table of equivalents given below.

"Second-feet per square mile" is the average number of cubic feet of water flowing from each square mile of area drained, on the assumption that the run-off is distributed uniformly in time and area.

"Run-off in inches" is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

"Gage height" is a term used to indicate the fluctuating stages of a stream at a particular point, with reference to an established datum which does not change. Gage height has no reference to the depth of the water but is merely the elevation of the water surface above a fixed point, while the zero of gage heights is generally below the minimum stage. For example, at Wilkes-Barre, on the North Branch of the Susquehanna River, when the gage height is 4.35 feet the maximum depth in the river at that point is 18.5 feet.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

1 second-foot equals 7.48 U. S. gallons per second; equals 448.8 gallons per minute; equals 646.272 gallons for one day.

1 second-foot equals 6.23 British Imperial Gallons per second.

1 second-foot for one year covers 1 square mile 1.131 feet or 13.57 inches deep.

1 second-foot for one year equals 31,536,000 cubic feet.

1 second-foot for one day covers 1 square mile 0.03719 inch deep.

1 second-foot for one 28-day month covers 1 square mile 1.041 inches deep.

1 second-foot for one 29-day month covers 1 square mile 1.079 inches deep.

1 second-foot for one 30-day month covers 1 square mile 1.116 inches deep.

1 second-foot for one 31-day month covers 1 square mile 1.153 inches deep.

1 foot per second equals 0.68 miles per hour.

100 United States gallons per minute equals 0.223 second-feet.

1,000,000 United States gallons per day equals 1.55 second-feet.

1 inch deep on 1 square mile equals 2,323,200 cubic feet.

1 mile-foot is 12 inches depth on one square mile and equals 27,878,400 cubic feet.

1 cubic foot equals 7.48 gallons.

1 cubic foot of water weighs 62.5 pounds.

1 horse-power equals 550 foot-pounds per second.

1 horse-power equals 746 watts; 1 kilowatt equals 1.34056 H. P.

1 horse-power equals 1 second-foot falling 8.80 feet, 100 per cent. efficiency.

To calculate water power quickly $\frac{\text{Sec. ft. x fall in feet}}{11}$ = net horse power on shaft of water wheel realizing 80 per cent. of theoretical power.

FLOOD WARNING SERVICE.

The Flood Warning Service, organized by virtue of the Act of May 23, 1913, has proven itself of value to the Commonwealth and worthy of perpetuation. The Flood Warning Act was reprinted in the 1913 Report, page 83.

The service has been extended over a much larger portion of the State and additional stream gaging and precipitation stations have been established. The following statement covers the period January 1st, 1914 to September 30th, 1914, in order to conform to that of the Hydrographic Division, of which it is a part.

GAGES AND GAGING STATIONS.

The watersheds of the Allegheny and Monongahela rivers are more completely gaged than any other streams in Pennsylvania and no additional gaging stations have been established in the Ohio

Drainage Basin for flood warning purposes. With long time records and comprehensive data, one of the best forecasting systems of the country has been developed for the western part of Pennsylvania. There are 56 gages operated in the Ohio Drainage Basin within the limits of this State, of which 40 are regular gaging stations and 16 are gage height stations, while several other gages furnish partial records and could be readily linked with the system if desirable. Two gage height stations have been added to the forecasting system of the West Branch Watershed of the Susquehanna River, since the last report, at Driftwood and Sinnemahoning, Cameron County.

The Driftwood gage is on the Driftwood Branch of Sinnemahoning Creek near its mouth and the Sinnemahoning gage is on Sinnemahoning Creek just above the mouth of the First Fork. These gages are painted on bridge piers and were intermittently operated for several years prior to 1905. The records of these stations have been of value in determining relations with other gages in this watershed, but their value will be enhanced by additional high stage readings. The observers read the gages during excessive flow in the streams and submit reports by telegraph, no attention being given to low gage heights.

There are 20 gages maintained in the West Branch Watershed of the Susquehanna River, 14 regular gaging stations and 6 gage height stations. Fourteen of those which were established for flood warning purposes are located as shown in Tables Nos. 23 and 24.

TABLE NO. 23.

Flood Warning Stations in West Branch Susquehanna River Watershed.

Stream.	Location.
Buffalo Creek,	Lewisburg, Union County.
Chest Creek,	St. Lu, Clearfield County.
Clearfield Creek,	Dimeling, Clearfield County.
Driftwood Branch, Sinnemahoning Creek,	Sterling Run, Cameron County.
Kettle Creek,	Leidy, Clinton County.
Lycoming Creek,	Trout Run, Lycoming County.
Moshannon Creek,	Winburne, Clearfield County.
Susquehanna River,	Bower, Clearfield County.

TABLE NO. 24.

Gage Height Stations in West Branch Susquehanna River Watershed.

Stream.	Location.
Driftwood Branch, Sinnemahoning Creek,	Driftwood, Cameron County.
Sinnemahoning Creek,	Sinnemahoning, Cameron County.
Susquehanna River,	Clearfield, Clearfield County.
Susquehanna River,	Jersey Shore, Clinton County.
Susquehanna River,	Lewisburg, Union County.
Susquehanna River,	Lock Haven, Lycoming County.

Gage heights were observed at Allenwood, Keating and Karthaus for several years and it is probable that relations can be determined between these and other gages in this watershed, and gage readings resumed at these locations advantageously to the system.

As a result of the reconnoissance of the North Branch of the Susquehanna River and its principal tributaries within the limits of Pennsylvania, the following stations were established:

TABLE NO. 25.

New Gaging Stations on North Branch Susquehanna River Watershed.

Stream.	Location.
Bowman Creek,	Eatonville, Wyoming County.
Fishing Creek,	Bloomsburg, Columbia County.
Mehoopany Creek,	Mehoopany, Wyoming County.
Susquehanna River,	Towanda, Bradford County.
Towanda Creek,	Monroeton, Bradford County.
Tunkhannock Creek,	Dixon, Wyoming County.

In addition to these stations, gage readers at Chemung and Corning, on the Chemung River in New York, submit telegraphic reports during high water. Gage heights have been observed at Towanda since October 1, 1892, furnishing valuable information for forecasting calculations. To change this gage height station into a regular gaging station, an observer was employed and discharge measurements made. Gaging stations are also maintained at Danville, Moosic, Wilkes-Barre and Wyalusing from which regular reports are received and valuable data have been assembled for flood warning predictions. There are three gage height stations along the main stream at Catawissa, Creasy and East Bloomsburg, at which high water readings have been occasionally observed and if a relation with other stations can be determined upon, these gages will probably be included in the system.

No additional gages have been installed in the Juniata River Watershed for flood warning use, but there are five regular gaging stations maintained in this drainage area from which regular reports are received.

Gage height stations were operated at Lewistown and Mifflin for several years and they will probably be again operated for flood predictions.

The Selinsgrove gage height station which has been added to the system was established on October 1, 1892 and has since been continuously operated. It is on the Susquehanna River about five miles below the confluence of the North and West Branches and the records of high flow show a good relation with the Harrisburg gage, but the time interval between these stations is short.

Harrisburg is a regular gaging station and the Harrisburg, Selinsgrove and Holtwood gages are the only ones operated on the main stream. There are, however, regular gaging stations on Conodoguinet, Yellow Breeches and Swatara creeks, which are large tributaries.

A reconnaissance of the Schuylkill River resulted in establishing the following gaging stations, which are maintained for flood warning purposes.

TABLE NO. 26.

New Gaging Stations on the Schuylkill River.

Stream.	Location.
Schuylkill River,	Conshohocken, Montgomery County.
Little Schuylkill River,	Molino, Schuylkill County.
Schuylkill River,	Reading, Berks County.
Schuylkill River,	Schuylkill Haven, Schuylkill County.

At Reading a gage height station has been operated by the U. S. Weather Bureau since August 1, 1904, and it is believed that the record will be of assistance in forcasting work. The new gage is at the Penn Street Bridge which is about three-quarters of a mile upstream from the Weather Bureau station and was established for three reasons: Discharge measurements are not possible at the former gage, its location does not permit of convenient telegraphic service and during high stages the gage is not accessible.

There is a regular gaging station at Graters Ford, Montgomery County, on Perkiomen Creek, a large tributary of the Schuylkill River, and several gage height stations along the main stream, which are operated by the Schuylkill Navigation Company, should be connected with the system.

There are at present aside from the above mentioned stations, 17 gages maintained in the Delaware drainage basin, several of which are in New York and New Jersey, and no additional gages have been established along the main river or its smaller tributaries for flood warning purposes.

As this river is influenced by tributary drainage from other states, it would be necessary to have gages outside of the State or co-operate with other systems before flood heights can be accurately predicted along this stream. This river has probably been visited by floods to the same extent as other streams, yet the amount of damage encountered therefrom has been less than along any other river in this State owing to topographical features and the sparse population.

RESUME.

There are 44 stations maintained for flood warning purposes of which 26 were established pursuant to the requirements of the Flood Warning Act. Of these 26 stations, 19 are regular gaging stations and 7 are gage height stations, 12 gages having been installed in 1913 and 14 in 1914.

VELOCITY MEASUREMENTS.

At the stations maintained for flood warning purposes 247 velocity measurements have been made, of which 151 were at stations especially established for flood warning studies. Of the 247 measurements taken, 57 were made in 1913 and 190 in 1914. Of the 151 measurements taken at stations especially established for flood warning studies, 23 were made in 1913 and 128 in 1914.

From these velocity measurements the stream discharges have been calculated and the results embodied in the annual reports. Unfortunately no high discharges have occurred on streams where gages have been recently installed and the data thus far collected is of little assistance in flood warning studies though of value for other hydrographic considerations.

GAGE HEIGHTS.

Gage heights, or water surface elevations above a known datum, are the basis of all hydrographic studies and calculations, whatever the ultimate desired results may be. It is the height of water and not the quantity or discharge which is significant to the layman. The gage height is used in flood predictions and determines navigability and is the figure used by the press, lawyer, judge and jury.

Gage heights have been systematically observed in Pennsylvania for over 60 years though until recently neither Federal nor State authorities have given particular attention to observations of greatest importance to flood warning calculations, namely, the crest or maximum stage of a freshet or flood and the time when it actually occurred. In flood studies and calculations it has been necessary, with but few exceptions, to plot hydrographs and prolong rising and falling stages to an intersection in order to closely approximate the crest and the time when it occurred. Extra gage readings were occasionally taken by observers during high stages, although the maximum observed readings taken by them were not necessarily the maximum stages during any particular flood and care should be exercised in their use as they are often misleading.

Daily reports are received from the important river stations and hydrographs are plotted daily showing the exact conditions of the streams at all times. Whenever the flow in the tributaries approach

discharges which would accumulatively give flood stages in the main streams, or the river gage heights in the upper watersheds approach stages which would give flood heights at lower stations, telegraphic reports are received morning, noon and night, from observers.

PRECIPITATION AND RAINFALL STATIONS.

Precipitation in the form of rain, snow or sleet, is the prime factor to be considered in all flood forecasting calculations. During the summer the amount and intensity of the precipitation are the important factors which affect stream stages, while in the winter and early spring temperature is an important consideration.

Rainfall is extensively measured in Pennsylvania. In addition to about 100 rainfall stations maintained by the United States Weather Bureau and many others operated by individuals, corporations and private enterprises, the Water Supply Commission has established 18 stations, which are shown in the following tables:

TABLE NO. 27.

Rainfall Stations Established During 1914.

Place.	County.
Claridge,	Westmoreland County.
Harrisburg,	Dauphin County.
Murrayaville,	Westmoreland County.
Summit,	Crawford County.
Trafford,	Westmoreland County.
Transfer,	Mercer County.

TABLE NO. 28.

Rainfall Stations Established by Water Supply Commission.

Place.	County.
Claridge,	Westmoreland County.
Cloe,	Jefferson County.
Creekside,	Indiana County.
Cresson,	Clearfield County.
Eaglesmere,	Sullivan County.
Falls Creek,	Clearfield County.
Glenhazel,	Elk County.
Hadley,	Crawford County.
Harrisburg,	Dauphin County.
Linesville,	Crawford County.
Murrayaville,	Westmoreland County.
Pleasant Mount,	Wayne County.
Summit,	Crawford County.
Trafford,	Westmoreland County.
Transfer,	Mercer County.
Turnersville,	Crawford County.
Union City,	Erie County.
Westford,	Crawford County.

Weekly reports are received from rainfall stations stating the amount and nature of the precipitation together with soil conditions, temperature and amount of accumulated snow upon the ground. Whenever the rainfall amounts to one inch or more in 24 hours during the months of December, January, February, March, and two inches during the other months, telegraphic reports are submitted.

In January the average precipitation for the State was 3.37 inches or 0.14 inch greater than the average for the last 25 years. In the western part of the State and the mountain districts the greater portion of this fell in the form of snow, while in the southeastern portion it was mostly rain. The average snowfall for the entire State was slightly over 2.0 inches while the greatest was at Somerset, being 34.9 inches.

In February the precipitation was generally deficient except in the mountain districts where there was a moderate excess, and was largely in the form of snow which averaged 23.5 inches for the State, being the heaviest February snowfall since 1908. In some of the mountain districts the accumulated snow was the greatest for many years. Somerset had a total snowfall for the month of 53.0 inches, it being the heaviest, with two exceptions, during the last 27 years.

The precipitation for March was little more than two-thirds of the March average except in the northeastern part of the State where there was a slight excess. It occurred largely as snow which was unusually heavy in the southeast and over the watershed of the North Branch of the Susquehanna River. Moderate rains during the latter part of the month melted the snow and raised many of the streams to high stages.

The average precipitation for the State during April was 4.66 inches, or about 35 per cent. above the April average during the last 27 years. The excess was quite uniform in the western, northern and mountain districts, while in the southeast there was a slight deficiency.

In May more than three-fourths of the total rainfall occurred during the first half of the month, being generally excessive in the north and especially in the northeast, while there was considerably less than the May average across the southern half of the State. The average excess in the northern half was about 20 per cent., while in the southern half the average deficiency was about 40 per cent.

The discharge at the Harrisburg station, which controls the largest drainage area in Pennsylvania, was 17 per cent. in excess of the normal for the first five months and inasmuch as both run-off and

precipitation were excessive, the Commonwealth probably escaped some destructive floods owing to moderate temperature and precipitation.

Pennsylvania has been fortunate in not having a large storm, similar to the one experienced in the Ohio Valley during 1913, centered over any of its drainage basins. This storm, though of greater intensity than the one which visited Pennsylvania in 1889, has been surpassed by storms further west. It is conceivable that if a storm of similar magnitude to those which have occurred over neighboring states centers itself over Pennsylvania under similar conditions, the resulting floods would exceed all former records. Even a storm of the same precipitation as that of 1889, under similar conditions, would give flood heights of greater amplitude than those previously experienced owing to stream encroachments which were carried on for many years previous to the enactment of laws which gave the Water Supply Commission authority to prohibit their construction.

FLOOD WARNINGS.

Forecasting maximum stages to be expected along Pennsylvania streams is quite different from similar work on large rivers where the flood crest can be traced from a station near its source to its mouth. On the North Branch of the Susquehanna River flood crests frequently occur at Binghamton and Wilkes-Barre at the same time, notwithstanding that Binghamton is about 130 miles above Wilkes-Barre. The West Branch of the Susquehanna River often crests at Clearfield, Renovo and Williamsport about the same time, although Clearfield is 130 miles and Renovo 60 miles above Williamsport. On swift running streams it is frequently impossible to make a forecast for more than 24 hours in advance, while on the large and slower moving rivers they can be made accurately four or more days in advance.

Studies of forecasting methods applied to Pennsylvania streams divide themselves into three distinct phases: Relation curves, compilation of discharges, and empirical formulae.

When there are no large tributaries entering a stream between stations, crest relation and time curves may be plotted and used with satisfactory results. On other streams, where large tributaries enter between gaging stations, a compilation of discharges of the several tributaries and main stream, applied to a station below, give reasonable accuracy. For forecasting probable heights to be expected at stations along a large river below the confluence of two or more important branches it has been found that certain empirical formulae, applied to stations on the streams above the confluences, give the best solution.

The only stream to overflow its banks in flood stage since the passage of the Flood Warning Act, was the North Branch of the Susquehanna River which furnished the first and only real test of the State Flood Warning Service. On Friday morning, March 27, 1914, gage height reports, received by the Water Supply Commission, showed that fairly high stages might occur along the streams of the Susquehanna Valley but that damaging heights would probably occur only along the North Branch. It was predicted that at Wilkes-Barre a stage of 23 feet would be reached on the morning of the 28th and a warning to that effect was accordingly telegraphed to the newspapers of that city. The estimated stage of 23 feet, which was 5 feet above danger line, reached that city at 6.00 A. M. on Saturday morning, the 28th, as predicted. Later reports received Friday night and Saturday morning indicated that additional rain had fallen and that the upper tributaries were rising rapidly, showing that higher stages would be reached on Sunday. On Saturday, the 28th, morning estimates were made for points along the North Branch and sent over the wires to the cities and towns involved. The predicted stages and the maximum stages which actually occurred are shown in the following table:

TABLE NO. 29.

Predicted and Actual Stages on North Branch, Susquehanna River, March 28, 1914.

Location.	Predicted stage.	Maximum stage.
Corning,	16.5	16.6
Chemung,	17.5	17.5
Binghamton,	18.8	18.5
Towanda,	20.5	20.2
Wilkes-Barre,	28.5	28.4

At Wilkes-Barre and vicinity, where the river rose proportionately higher than at other points, reaching a stage 10.5 feet above the danger stage on Sunday morning, the maximum height came within one-tenth of a foot of the stage predicted by the Commission and arrived within one hour of the predicted time.

The damage done at Wilkes-Barre and in the valley of the North Branch of the Susquehanna River above and below that city was considerable, estimated at about $30,000, yet the loss was greatly curtailed by the early accurate warnings.

During the construction of the Susquehanna River Dam at Harrisburg and the river front wall, close communication was kept with the upstream stations and many times warnings were issued to the contractors from 24 to 36 hours in advance of approaching freshets which would have seriously damaged their work and plants had they come unexpectedly. These contractors estimated that on one occasion they were saved $3,500, a sum equivalent to 35 per cent. of the appropriation for the Flood Warning Service.

The demands of the public for information concerning the rivers are persistently increasing which is evidence of the efficiency and popularity of the Service. Its cost is insignificant while its direct benefits to municipalities and commercial interests can be measured only by much larger amounts.

During the last century there have been several great floods in Pennsylvania, the largest of which have been caused by excessive precipitation while others have been augmented by ice gorges. The life losses have been numerous and the destruction of property has been enormous. The damage from floods increases with the increase of population.

Until the water resources of the State are developed and the stream flow regulated, it is of vital importance that the Flood Warning Service, which is now in its infancy, be continued and developed to its utmost efficiency for the safety and protection of our citizens and their property. With the continuation of the Flood Warning Service the loss of life should be decreased materially and monetary losses reduced to a minimum.

It is therefore respectfully recommended that the Legislature of 1915 appropriate the sum of ten thousand dollars for the continuance of the Flood Warning Act as passed by the Legislature of 1913.

APPENDIX

HYDROGRAPHIC DATA

FOR

1914

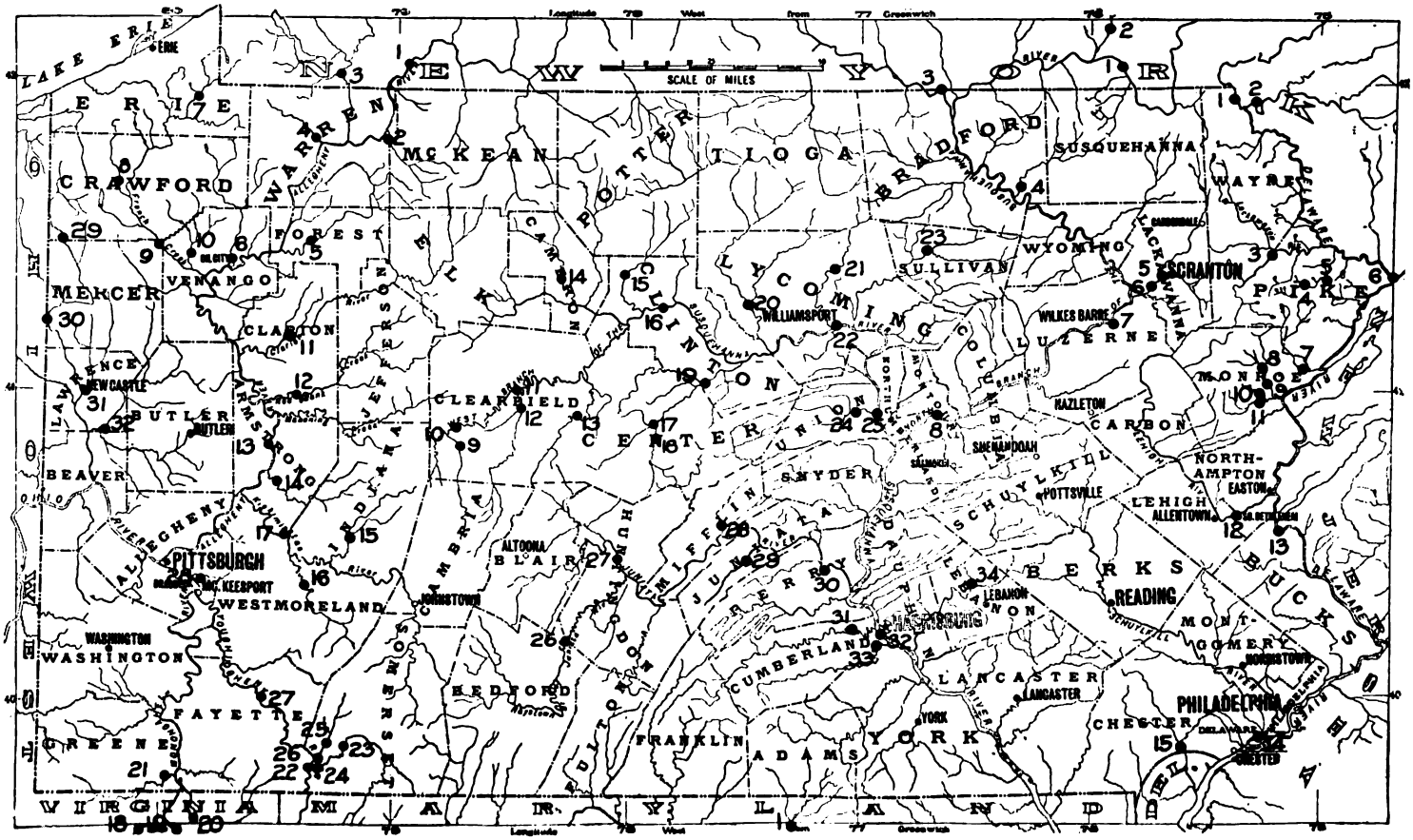
WATER SUPPLY COMMISSION OF PENNSYLVANIA

MAP SHOWING LOCATION

—OF—

GAGING STATIONS

1914



DELAWARE BASIN

EAST BRANCH DELAWARE RIVER.

DESCRIPTION OF BASIN.

This stream rises at Grand Gorge in north east Delaware County, New York, on the western slope of the Catskill Mountains, at an elevation of 1,560 feet above sea level, and flows southwest through a hilly, plateau region, well populated in the main valley and in those of some of the largest tributaries, to its junction with the West Branch at Hancock, New York. The headwaters of its tributaries are in a wild, uninhabited region, well timbered, the highest hills reaching to 4,000 feet above sea level. Its largest tributary is Beaver Kill, coming in about 20 miles above Hancock on which stream are many lakes and ponds. The drainage area is broader and tributaries longer than those of the West Branch.

The total drainage area of the East Branch is 840 square miles, over which the mean annual precipitation is approximately 40 inches.

From its mouth to Margaretville, a distance of about 55 miles, the slope is 430 feet, giving an average slope of 8 feet per mile.

The discharge has been measured at Hancock, New York, from October, 1902, to December, 1912, and at Fish Eddy, New York, from November, 1912.

DELAWARE BASIN—STATION NO. 1.

EAST BRANCH DELAWARE RIVER AT FISH EDDY, N. Y.

DESCRIPTION OF STATION.

LOCATION—On the highway bridge near the N. Y., Ontario, and Western Ry. Station at Fish Eddy, 5½ miles above the confluence of the East and West branches of the Delaware River at Hancock, N. Y.

RECORDS AVAILABLE—Discharge complete from November 19, 1912, to September 30, 1914.

DRAINAGE AREA—790 square miles.

GAGE—A vertical staff in two sections, read by John Fininegan.

DISCHARGE MEASUREMENTS—At low stages by wading, at high stages from the highway bridge.

CHANNEL—The bed is composed of coarse gravel, apparently permanent. The winter flow is somewhat affected by ice.

REMARKS—The data on this station have been furnished by the United States Geological Survey.

DISCHARGE MEASUREMENTS OF EAST BRANCH DELAWARE RIVER AT FISH EDDY, NEW YORK.

(Drainage area 790 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
13	Jan. 5	DeGolyer, ...	126	245	2.50	3.01	601	0.2 & 0.8 msmt.
14	Jan. 5	DeGolyer, ...	140	203	2.00	3.02	623	0.6 msmt.
15	Jan. 20	DeGolyer, ...	158	282	1.42	3.86	399	Msmt. under ice cover.
16	Jan. 29	DeGolyer, ...	164	359	2.29	4.26	816	Msmt. under ice cover.
17	Feb. 2	DeGolyer, ...	189	555	4.34	5.32	2410	0.2 & 0.8 msmt.
18	Feb. 19	Barnes, ...	178	402	1.54	5.51	618	Msmt. under ice cover.
19	Mar. 20	Barnes, ...	190	500	1.52	6.11	760	Msmt. under ice cover.
20	Apr. 2	Barnes, ...	378	2560	4.22	9.40	10800	0.2 & 0.8 msmt.
21	Apr. 21	Covert, ...	383	2670	4.16	9.70	11100	0.2 & 0.8 msmt.
22	Apr. 23	Covert, ...	383	2020	3.64	7.91	7360	0.2 & 0.8 msmt.
23	Sept. 21	DeGolyer, ...	106	184	0.89	1.90	162	Wading 300 ft. below gage.

DISCHARGE TABLE FOR EAST BRANCH DELAWARE RIVER AT FISH EDDY, N. Y., FOR GAGES AT RAILROAD BRIDGE FROM NOV., 1912.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1.50	67	.50	370	.40	870	.30	1740	.20	2890
.60	88	.60	412	.50	950	.40	1850	.30	3040
.70	110	.70	456	.60	1040	.50	1960	.40	3190
.80	134	.80	504	.70	1130	.60	2080	.50	3340
.90	161	.90	556	.80	1220	.70	2200	.60	3500
2.00	190	3.00	610	.90	1320	.80	2330	.70	3660
.10	222	.10	670	4.00	1420	.90	2470	.80	3820
.20	256	.20	730	.10	1520	5.00	2600	.90	3990
.30	292	.30	800	.20	1630	.10	2740	6.00	4160
.40	330								

DISCHARGE TABLE FOR EAST BRANCH DELAWARE RIVER AT FISH EDDY, N. Y., FOR GAGE AT HIGHWAY BRIDGE FROM NOV., 1912.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet	Sec. ft.	Feet	Sec. ft.	Feet	Sec. ft.	Feet	Sec. ft.	Feet	Sec. ft.
6.00	3650	.50	6390	9.00	9730	.50	13500	.10	17720
.10	3810	.60	6600	.10	9970	.60	13760	.20	17990
.20	3970	.70	6810	.20	10210	.70	14020	.30	18260
.30	4130	.80	7020	.30	10450	.90	14540	.40	18530
.40	4300	.90	7230	.40	10700	11.00	14800	.50	18800
.50	4470	8.00	7450	.50	10950	.10	15060	.60	19080
.60	4650	.10	7670	.60	11200	.20	15320	.70	19360
.70	4830	.20	7890	.70	11450	.30	15580	.80	19640
.80	5010	.30	8110	.80	11700	.40	15840	.90	19920
.90	5200	.40	8330	.90	11950	.50	16100	13.00	20200
7.00	5390	.50	8560	10.00	12200	.60	16370	14.00	23000
.10	5580	.60	8790	.10	12460	.70	16640		
.20	5780	.70	9020	.20	12720	.80	16910		
.30	5980	.80	9250	.30	12980	.90	17180		
.40	6180	.90	9490	.40	13240	12.00	17450		

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF EAST BRANCH DELAWARE RIVER AT FISH EDDY, N. Y.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	3.10	670	.....	2890	4.7	462	9.8	11500	.....	.....	2.60	412	2.25	274	2.15	239	2.70	456
2,	2.70	456	5.3	2460	4.6	462	10.8	14400	.....	.....	2.50	370	2.50	370	2.05	206	2.80	504
3,	3.05	640	5.1	2080	4.6	462	9.8	11500	.....	.....	2.50	370	2.45	350	2.05	206	2.75	480
4,	3.20	730	4.8	1740	4.5	462	12.5	19600	.....	.....	2.80	504	2.30	292	2.00	190	2.70	456
5,	3.00	610	4.8	1850	4.5	462	12.6	20000	.....	.....	3.30	800	2.20	256	1.95	176	2.50	370
6,	2.60	412	4.8	1680	4.5	462	11.7	17100	.....	.....	2.80	504	2.35	311	1.95	176	2.45	350
7,	2.60	412	4.6	1220	4.6	462	10.7	14100	.....	.....	2.60	412	2.55	391	1.90	161	2.40	330
8,	2.85	530	4.5	1040	4.6	462	10.0	12000	.....	.....	3.25	765	2.55	391	1.90	161	2.30	292
9,	2.80	504	4.4	870	4.6	462	9.8	11500	.....	.....	3.35	835	2.55	391	1.90	161	2.25	274
10,	2.65	434	3.3	730	4.5	462	9.5	10800	5.10	2640	2.90	556	2.65	434	1.95	176	2.20	256
11,	2.60	330	4.0	583	4.5	462	9.3	10100	4.90	2390	2.70	456	2.55	391	1.95	176	2.15	239
12,	2.70	292	4.5	434	4.4	462	9.1	9920	4.80	2270	2.60	412	3.00	610	2.60	412	2.10	222
13,	3.80	293	5.2	456	4.4	462	9.1	9920	4.70	2150	2.45	350	2.60	412	2.50	370	2.05	206
14,	4.00	256	6.5	870	4.4	462	9.0	9700	5.00	2510	2.40	330	2.40	330	2.30	292	2.05	206
15,	4.20	350	6.2	835	4.4	462	8.9	9480	6.20	4200	2.30	292	2.45	350	2.15	239	2.00	190
16,	4.30	504	5.8	800	4.3	462	9.0	9700	5.80	3800	2.35	311	2.45	350	2.05	206	1.95	176
17,	.....	556	5.7	765	4.8	462	8.9	9480	5.10	2640	2.30	292	2.40	330	2.00	190	1.95	176
18,	.....	530	5.7	730	4.9	462	8.9	9480	4.40	1810	2.25	274	2.55	391	2.05	206	1.95	176
19,	.....	456	5.6	670	5.5	434	8.9	9480	3.90	1290	2.20	256	2.50	370	2.45	350	1.95	176
20,	3.80	391	5.5	583	6.3	870	10.4	12200	3.80	1200	2.30	292	2.55	391	3.25	765	1.95	176
21,	3.70	330	5.3	504	7.1	1630	10.2	12600	3.70	1110	2.30	292	2.50	370	4.70	2150	1.90	161
22,	3.60	311	5.3	480	6.1	800	8.7	9040	3.60	1030	2.30	292	2.50	370	4.70	2150	1.95	176
23,	3.50	256	5.2	434	5.4	391	7.0	5600	3.50	950	2.25	274	2.40	330	3.70	1110	1.80	134
24,	3.45	239	5.0	350	5.4	370	6.8	5220	3.30	800	2.35	311	2.50	370	3.40	870	1.85	148
25,	3.40	222	4.9	330	5.6	480	6.6	4860	3.20	730	2.40	330	2.50	370	3.15	700	1.80	134
26,	3.35	222	4.9	330	6.3	2460	.....	.....	3.20	730	2.25	274	2.35	311	2.90	556	1.80	134
27,	3.35	239	4.8	311	10.2	12600	.....	.....	3.10	670	2.15	239	2.25	274	2.75	480	1.90	161
28,	3.25	239	4.8	274	14.8	27900	.....	.....	3.05	640	2.25	274	2.30	292	2.75	480	1.85	148
29,	4.20	800	.....	.....	13.2	22000	.....	.....	3.00	610	2.30	292	2.30	292	2.80	504	1.80	134
30,	5.20	2200	.....	.....	10.0	12000	.....	.....	2.95	583	2.30	292	2.25	274	3.00	610	1.80	134
31,	.....	3660	.....	.....	8.8	9280	.....	.....	2.90	556	.....	.....	2.25	274	2.80	504	.....	.....

Gage heights affected by ice Jan. 11 to Mar. 26 inclusive. Daily discharge given in this period is approximate only. Mean discharge for periods estimated as follows: March 1 to 18, 462 sec. ft.; April 26 to May 9, 5010 sec. ft.

ESTIMATED MONTHLY DISCHARGE OF EAST BRANCH DELAWARE RIVER AT FISH EDDY, N. Y.

(Drainage area 790 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	3660	222	583	.738	0.85
February,	2890	274	937	1.190	1.24
March,	27900	370	3210	4.060	4.68
April,	20000	.....	10500	13.300	*14.84
May,	.....	556	1830	2.320	*2.68
June,	835	239	389	0.492	0.55
July,	610	256	352	0.446	0.51
August,	2150	161	489	0.619	0.72
September,	504	134	239	0.303	0.34

Gage heights affected by ice Jan. 11 to Mar. 26 inclusive. Daily discharge given in this period is approximate only. Mean discharge for periods estimated as follows: March 1 to 18, 462 sec. ft.; April 26 to May 9, 5010 sec. ft.
*Estimated.

WEST BRANCH DELAWARE RIVER.

DESCRIPTION OF BASIN.

This stream has its source in a small lake almost on the line of Schoharie and Delaware counties, New York, at an elevation of approximately 1,900 feet above sea level, on the western slope of the Catskill Mountains and drains a total of 660 square miles. It flows southwesterly through a hilly, plateau region, well populated in the main valley, and the hills well timbered, to Deposit, about 5 miles above the state line, where it turns southeast and in about 5 miles joins the East Branch at Hancock, New York. About 8 miles above Deposit at Cannonsville is the site of a large storage reservoir proposed by the State Water Supply Commission of New York to flood a long, broad valley, and contain approximately 7,000,000,000 cubic feet available storage.

At Hancock, the elevation is 895 feet above sea level, and the rise from there to Cannonsville, 16 miles above, is at the rate of 7 feet per mile, while above this point the slope is steeper. In the upper section there are numerous lakes, ponds and swampy areas, the basin being relatively long and narrow with numerous short, lateral tribu-

taries. The largest tributary is Oquaga Creek, which comes in at Deposit from the west. The mean annual precipitation over this watershed is approximately 40 inches.

The discharge of this stream has been measured from October, 1902, to December, 1912, at Hancock, N. Y., near its mouth, and from November, 1912, at Hale Eddy, N. Y.

DELAWARE BASIN—STATION NO. 2.

WEST BRANCH DELAWARE RIVER AT HALE EDDY, N. Y.

DESCRIPTION OF STATION.

LOCATION—On highway bridge 400 feet west of the Erie Railroad station in the village of Hale Eddy, 8¼ miles above junction with East Branch at Hancock, 8 miles below the power dam of the Deposit Electric Co.

RECORDS AVAILABLE—Discharge complete from November 15, 1912, to September 30, 1914.

DRAINAGE AREA—594 square miles.

GAGE—A vertical staff gage in four sections, read by William Seely.

DISCHARGE MEASUREMENTS—Made by wading across three channels above the bridge, or one below, in low water. High water measurements made from highway bridge.

CHANNEL—The bed of the stream consists of coarse gravel and boulders. The control is about ¾ mile below the gage and is apparantly permanent. Between the control and the gage there is low land behind the left bank which is overflowed by extreme high water. The gage heights during the winter are seriously affected by ice.

REMARKS—The data on this station have been furnished by the United States Geological Survey.

DISCHARGE MEASUREMENTS OF WEST BRANCH DELAWARE RIVER AT HALE EDDY, N. Y.

(Drainage area 594 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
8	Jan. 6	DeGolyer, ...	254	420	0.94	4.85	394	Msmt under complete ice cover.
9	Jan. 21	DeGolyer, ...	270	284	1.06	4.97	248	Msmt. under complete ice cover.
10	Jan. 30	DeGolyer, ...	220	676	2.24	6.39	1510	Msmt. under complete ice cover.
11	Feb. 2	DeGolyer, ...	215	931	2.47	6.34	2300	0.2 & 0.8 msmt.
13	Feb. 19	Barnes, ...	190	656	0.98	4.94	644	Msmt. under complete ice cover.
13	Mar. 21	Barnes, ...	208	455	0.67	5.30	304	Msmt. under complete ice cover.
14	Apr. 1	Barnes, ...	220	1500	3.88	8.26	5820	0.2 & 0.8 msmt.
15	Apr. 22	Covert, ...	221	1560	3.50	7.91	5460	0.2 & 0.8 msmt.
16	Sept. 22	DeGolyer, ...	196	232	0.43	1.78	99	Wading ¼ mile below gage.
17	Sept. 22	DeGolyer, ...	122	220	0.45	1.78	100	Wading 300 ft. below gage.

DISCHARGE TABLE FOR WEST BRANCH DELAWARE RIVER AT HALE EDDY, N. Y., FROM NOV., 1912.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet	Sec. ft.	Feet	Sec. ft.	Feet	Sec. ft.	Feet	Sec. ft.	Feet	Sec. ft.
1.00	1f	.80	1140	.60	3560	.40	7350	.20	14040
.10	24	.90	1210	.70	3670	.50	7530	.30	14240
.20	36	4.00	1280	.80	3780	.60	7710	.40	14650
.30	50	.10	1355	.90	3890	.70	7890	.50	14960
.40	66	.20	1430	7.00	4000	.80	8080	.60	15230
.50	84	.30	1505	.10	4120	.90	8270	.70	15600
.60	104	.40	1580	.20	4240	10.00	8470	.80	15920
.70	126	.50	1660	.30	4360	.10	8670	.90	16260
.80	150	.60	1740	.40	4480	.20	8880	13.00	16600
.90	176	.70	1820	.50	4600	.30	9090	.10	16950
2.00	204	.80	1900	.60	4720	.40	9310	.20	17300
.10	234	.90	1985	.70	4840	.50	9530	.30	17650
.20	268	5.00	2070	.80	4960	.60	9760	.40	18000
.30	304	.10	2155	.90	5090	.70	9990	.50	18350
.40	342	.20	2240	8.00	5220	.80	10230	.60	18700
.50	382	.30	2325	.10	5350	.90	10470	.70	19050
.60	424	.40	2410	.20	5480	11.00	10720	.80	19400
.70	470	.50	2500	.30	5620	.10	10970	.90	19750
.80	520	.60	2590	.40	5760	.20	11230	14.00	20100
.90	575	.70	2680	.50	5900	.30	11490	.10	20460
3.00	630	.80	2770	.60	6050	.40	11760	.30	20820
.10	685	.90	2860	.70	6200	.50	12030	.30	21180
.20	745	6.00	2950	.80	6350	.60	12310	.40	21540
.30	805	.10	3050	.90	6500	.70	12590	.50	21900
.40	870	.20	3150	9.00	6670	.80	12870	15.00	22700
.50	935	.30	3250	.10	[illegible]	.90	13160	.50	25500
.60	1000	.40	3350	.20	[illegible]	12.00	13450	16.00	27300
.70	1070	.50	3460	.30	[illegible]	.10	13740		

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF WEST BRANCH DELAWARE RIVER AT HALE EDDY, N. Y.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	2.55	395	7.40	4550	4.10	.....	8.00	5520	5.00	2060	2.30	280	2.10	200	2.10	200	2.70	470
2,	4.60	260	5.40	2330	4.40	.....	8.80	6770	4.60	1740	2.50	370	2.10	200	1.90	138	2.60	420
3,	4.90	420	4.70	1740	4.40	.....	7.80	5230	4.30	1500	2.70	470	2.10	200	1.80	115	2.95	610
4,	4.80	348	4.80	1900	4.40	.....	6.50	3560	4.10	1350	2.70	470	2.10	200	1.80	115	2.95	610
5,	4.00	302	4.80	1900	4.60	.....	6.10	3120	4.90	1980	2.70	470	2.00	165	1.80	115	2.65	445
6,	4.60	260	3.40	880	4.60	.....	5.60	2610	6.30	3340	2.55	395	2.20	240	1.80	81	2.50	370
7,	4.20	240	3.80	1140	4.60	.....	5.40	2420	5.30	2330	2.65	445	2.50	370	1.60	81	2.50	370
8,	3.60	240	3.40	880	4.40	.....	7.80	5230	4.80	1900	2.60	420	2.70	470	1.70	96	2.30	280
9,	3.60	220	2.65	420	4.40	.....	11.20	11900	4.60	1740	3.20	760	2.85	553	2.00	165	2.30	280
10,	3.40	220	2.60	395	4.20	.....	8.20	5820	4.40	1580	2.80	525	3.60	1000	2.10	200	2.10	200
11,	5.00	280	2.80	280	4.20	.....	6.90	4040	4.00	1280	2.70	470	3.70	1070	2.00	165	2.10	200
12,	5.80	395	2.35	126	3.80	.....	6.00	3000	4.70	1820	2.85	302	3.60	1000	1.90	138	2.05	182
13,	5.10	302	2.60	70	3.80	.....	6.00	3010	7.10	4290	2.20	240	3.20	760	1.80	115	2.00	165
14,	5.20	325	3.60	96	3.70	.....	5.40	2420	6.20	3230	2.05	182	3.00	640	1.80	115	1.95	152
15,	5.00	260	4.20	280	3.40	.....	5.20	2240	5.60	2610	2.00	165	2.90	580	1.80	115	1.90	138
16,	5.20	348	4.80	525	3.70	.....	5.70	2710	5.40	2420	2.15	220	2.70	470	1.80	115	1.85	126
17,	5.00	260	4.80	580	5.00	.....	5.60	2610	4.70	1820	2.00	165	2.55	395	1.80	115	1.80	138
18,	5.00	260	4.80	552	6.60	2610	5.30	2330	4.80	1500	1.90	138	2.70	470	1.90	138	1.75	106
19,	4.90	220	5.00	640	6.40	1580	5.20	2240	4.60	1280	1.80	115	3.10	700	3.40	880	1.90	138
20,	4.80	182	5.00	640	5.60	470	8.70	6610	3.80	1140	2.00	165	2.70	470	3.20	760	1.80	115
21,	4.90	220	4.80	580	5.40	325	9.80	8680	3.60	1000	2.00	165	2.50	370	4.10	1350	1.80	115
22,	4.60	138	4.80	525	5.20	260	7.80	5230	3.40	880	2.10	200	2.50	370	4.90	1980	1.80	115
23,	4.60	115	4.70	498	4.90	200	6.40	3450	3.20	760	1.95	152	2.60	420	4.00	1280	1.75	106
24,	4.70	152	4.60	470	4.60	182	5.60	2610	3.00	640	1.85	152	2.80	525	3.50	940	1.70	96
25,	4.80	165	4.50	395	4.40	220	5.20	2240	2.90	580	2.00	165	2.70	470	3.40	880	1.80	115
26,	5.00	240	4.30	.....	7.40	4680	5.60	2610	2.70	470	1.80	115	2.50	370	3.10	700	1.65	88
27,	4.90	325	4.20	.....	11.40	12400	5.90	2910	2.75	498	1.80	115	2.30	280	2.75	498	1.80	115
28,	5.00	552	4.20	.....	14.20	21000	5.60	2610	2.70	470	1.95	152	2.20	240	2.85	445	1.70	96
29,	5.40	760	.....	.....	11.50	12700	5.10	2150	2.55	395	2.20	240	2.10	200	2.70	470	1.70	96
30,	6.50	1580	.....	.....	9.40	7830	5.40	2420	2.45	348	2.20	240	2.10	200	3.00	640	1.70	96
31,	6.10	3120	.....	.....	8.40	6130	.....	.....	2.30	280	.....	.....	2.10	200	2.85	552	.....	.....

Note:—Gage heights affected by ice from Jan. 2-March 25 inclusive. Daily discharge given in this period is approximate only. Mean discharge Feb. 26-March 17 inclusive, estimated 648 sec. ft.

ESTIMATED MONTHLY DISCHARGE OF WEST BRANCH DELAWARE RIVER AT HALE EDDY, N. Y.

(Drainage area 611 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	3120	115	423	0.692	0.800
February,	4550	.....	849	1.390	1.450
March,	21000	182	2650	4.340	5.000
April,	11900	2150	3960	6.480	7.230
May,	4290	280	1520	2.490	2.870
June,	760	115	282	0.462	0.520
July,	1070	165	445	0.728	0.840
August,	1980	81	442	0.723	0.830
September,	610	88	218	0.357	0.400

Note:—Gage heights affected by ice from Jan. 2-March 25 inclusive. Daily discharge given in this period is approximate only. Mean discharge Feb. 26-March 17 inclusive, estimated 648 sec. ft.

LACKAWAXEN RIVER.

DESCRIPTION OF BASIN.

Lackawaxen River, the third largest tributary of the Delaware River in Pennsylvania, drains approximately 600 square miles in Pike and Wayne counties. Rising in a lake in the northwestern part of Wayne County, it follows a southeasterly course through a well populated agricultural region to Hawley, approximately 13 miles above its mouth, at which point it is joined by its largest tributary, Wallenpaupack Creek; thence following an easterly direction through a narrow, precipitous valley, covered with second growth timber and sparsely inhabited, to its mouth at Lackawaxen, Pike County, the total length being approximately 50 miles. Its source is at an elevation of about 1,950 feet above sea level, and its mouth about 600 feet. The principal tributaries are Dyberry, Middle and Wallenpaupack creeks, the watershed including a great number of lakes and ponds and, above Hawley, it is wide and spreads out along its several large tributaries, converging at this point. The stream lies entirely within the glacial area, the slope being steep and the flow rapid for most of its course. The valley in its upper section is wide, gradually narrowing as the stream leaves the plateau, and flowing through a gorge in the mountains to the Delaware River. In

its drainage basin lie the principal boroughs and villages of the county, several of which obtain water supplies from the tributaries and lakes in its watershed. The stream is used to a small extent for power purposes, while some sites are as yet undeveloped.

The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge has been measured since July 2, 1908, at Hawley, approximately 13 miles above the mouth, and since June 4, 1914, at Rowlands, approximately 5 miles above the mouth.

DELAWARE BASIN—STATION NO. 3.

LACKAWAXEN RIVER AT HAWLEY, PA.

DESCRIPTION OF STATION.

LOCATION—At single span, steel, through-truss, highway bridge, about 2,000 feet above mouth of Wallenpaupack Creek, at Hawley, Wayne County.

RECORDS AVAILABLE—Discharge complete from July 2, 1908, to July 31, 1913, and October 1, 1913, to September 30, 1914.

DRAINAGE AREA—290 square miles.

GAGE—A standard chain gage is attached to the upstream handrail. The length of chain from the bottom of the weight to the marker is 25.87 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is round steel rod 2 feet in from face of right abutment in upstream wingwall, and 3 feet up from ground, elevation 7.03 feet above gage datum. Bench Mark No. 2 is top of wire spike driven in lower side of twin tree 1½ feet above ground, and 6 feet upstream from the face of the upstream right wingwall, elevation 9.45 feet above gage datum. The gage is read thrice daily by J. S. Pennell.

DISCHARGE MEASUREMENTS—Taken from the upstream side of the bridge, and by wading at very low stages. The initial point for soundings is outer edge of upstream iron handrail post, right bank.

CHANNEL—The channel above and below the station is straight for 150 feet. The right bank overflows in extreme high floods. The left bank is high and not subject to overflow. The bed is composed of gravel and rock.

DISCHARGE MEASUREMENTS OF LACKAWAXEN RIVER AT HAWLEY, WAYNE COUNTY, PA.

(Drainage area 290 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1913		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
12	Aug. 7	Reckord, ...	100	102	0.98	0.60	100	Surf. & 0.6 method.
13	Sept. 25	Boehringer, ...	67	80	0.66	0.48	53	Surf. & 0.6 method.
	1914							
14	June 5	Hosmer & Wilson, ..	112	265	2.04	2.11	540	0.6 method.
15	June 24	Hosmer, ...	97	94	1.13	0.79	106	0.6 method.
16	Sept. 27	Taylor & Gough, ...	80	70	0.91	0.50	64	0.6 method.

DISCHARGE TABLE FOR LACKAWAXEN RIVER AT HAWLEY, WAYNE COUNTY, FROM JANUARY 1, 1912.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet	Sec. ft.	Feet	Sec. ft	Feet	Sec. ft.	Feet	Sec. ft.	Feet	Sec. ft.
0.00	26	.50	222	3.00	678	.50	1410	6.00	2288
.10	32	.60	244	.10	720	.60	1464	.10	2352
.20	38	.70	266	.20	764	.70	1520	.20	2416
.30	46	.80	290	.30	808	.80	1576	.30	2482
.40	54	.90	314	.40	854	.90	1632	.40	2548
.50	64	2.00	340	.50	902	5.00	1690	.50	2616
.60	74	.10	368	.60	950	.10	1748	.60	2684
.70	86	.20	396	.70	998	.20	1806	.70	2754
.80	100	.30	426	.80	1048	.30	1864	.80	2824
.90	114	.40	458	.90	1098	.40	1922	.90	2894
1.00	128	.50	490	4.00	1148	.50	1982	7.00	2966
.10	144	.60	524	.10	1198	.60	2042		
.20	162	.70	560	.20	1250	.70	2102		
.30	182	.80	598	.30	1302	.80	2164		
.40	202	.90	638	.40	1356	.90	2226		

Note:—This table is only applicable subsequent to Jan. 1, 1912, and is based on two discharge measurements made during 1912, together with former curve.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF LACKAWAXEN RIVER AT HAWLEY, WAYNE COUNTY, PA.

1913.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		OCT.		NOV.		DEC.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	3.84	826	.....	590	3.39	849	4.22	1260	3.30	808	1.69	264	0.64	79	†0.16	36	0.85	107	1.80	290
2,	2.94	654	.....	590	.....	‡647	3.78	1040	2.98	670	1.74	276	0.54	68	0.65	80	.....	‡102	1.61	246
3,	3.74	1020	.....	590	2.36	445	3.70	998	2.78	590	1.54	231	0.49	63	0.76	94	0.78	97	1.46	214
4,	4.09	1190	.....	590	2.16	395	3.42	864	2.50	490	1.39	200	0.27	44	0.68	78	0.61	75	1.43	206
5,	3.94	1120	.....	590	2.09	365	3.22	773	2.60	524	1.21	164	0.29	45	0.37	52	0.64	79	1.24	170
6,	3.89	1090	.....	590	2.04	351	.....	‡676	2.20	396	1.19	160	0.24	41	0.55	69	0.57	71	1.32	186
7,	3.99	1140	.....	590	1.89	312	2.75	579	2.10	368	1.27	176	0.54	63	0.36	51	0.57	71	1.49	220
8,	a8.47	†4000	.....	590	1.79	288	2.68	553	1.80	290	1.44	210	0.49	63	0.51	65	0.51	65	2.55	507
9,	6.24	2440	.....	590	.....	‡312	2.50	490	1.52	226	1.21	164	0.39	53	0.33	48	2.40	458	2.22	402
10,	4.52	1420	.....	590	1.99	337	2.20	396	1.48	218	1.14	151	0.67	82	0.38	52	c4.47	1390	1.76	280
11,	4.29	1300	.....	590	2.49	487	2.96	658	.....	‡218	1.04	134	0.57	71	0.39	53	3.40	854	1.69	264
12,	.....	‡1235	.....	590	2.46	477	4.20	1250	1.48	218	0.89	113	0.37	52	—0.10	†20	2.91	642	1.90	314
13,	4.04	1170	.....	590	2.26	414	.....	‡1230	1.35	192	0.91	115	0.21	39	0.49	63	2.65	542	1.84	300
14,	*	820	.....	590	3.34	826	4.12	1210	1.40	202	0.71	87	0.34	49	0.47	61	2.35	442	1.79	288
15,	.....	820	.....	590	4.74	1540	3.96	1120	1.15	153	.....	‡81	0.44	58	0.44	58	2.25	411	1.67	259
16,	.....	820	.....	590	.....	†1400	3.40	854	1.12	148	0.67	82	0.47	61	0.44	58	2.05	354	1.60	244
17,	.....	820	.....	590	3.99	1140	3.35	831	1.10	144	0.60	74	0.31	39	0.40	54	2.23	405	1.49	220
18,	.....	820	.....	590	3.59	945	2.99	674	.....	‡144	0.58	72	0.14	24	0.51	65	2.31	429	1.46	214
19,	.....	820	.....	590	3.34	826	2.78	590	1.10	144	0.54	68	0.17	36	.....	‡96	2.22	405	1.32	186
20,	.....	820	.....	590	3.10	720	3.50	902	1.00	128	0.49	63	0.09	31	0.99	127	2.35	442	0.98	125
21,	.....	820	.....	590	3.70	998	2.25	411	0.96	122	0.54	68	0.34	49	1.78	235	2.35	442	1.19	160
22,	.....	820	.....	590	4.22	1260	2.00	340	1.25	172	0.74	92	0.34	49	1.48	218	1.91	317	1.28	178
23,	.....	820	.....	590	3.35	831	1.92	319	1.52	226	0.74	92	0.27	44	1.30	182	1.79	288	1.29	180
24,	.....	820	.....	590	3.10	720	1.92	319	3.05	699	0.51	65	0.47	61	0.99	127	1.67	259	1.86	304
25,	.....	820	.....	590	3.38	846	2.06	354	.....	‡544	0.54	68	0.79	99	1.31	184	1.50	222	2.17	388
26,	.....	820	.....	590	4.18	1240	1.90	314	2.18	390	0.54	68	0.87	110	1.96	330	1.47	216	2.04	351
27,	.....	410	.....	590	b7.75	†3500	1.80	290	1.85	302	0.54	68	.....	‡92	1.90	314	1.46	214	1.56	235
28,	.....	410	.....	590	9.25	†4550	2.55	507	2.52	497	0.57	71	0.59	73	1.35	192	1.35	192	2.01	343
29,	.....	410	.....	.....	6.20	2420	4.05	1170	3.50	902	.....	‡72	0.47	61	1.14	151	1.55	223	2.19	398
30,	.....	410	.....	.....	5.00	1690	3.80	1050	2.80	598	0.59	73	0.34	49	1.10	144	2.07	360	2.11	371
31,	.....	410	.....	.....	4.30	1300	.....	.....	2.40	458	.....	.....	0.29	45	1.06	138	.....	.....	1.91	317

Notes:—‡Interpolated. Although for 31 days in Aug. and Sept. zero gage hts. were reported by the observer, the water was actually below zero and, for this reason, the discharge for these two months has not been published. †Estimated. *Ice conditions Jan. 14 to Feb. 28, discharge estimated from Big Bushkill Creek at Shoemakers and Lehigh River at Bethlehem. aMax. 9.04 at 4:00 p. m.; †4400 sec. ft. bMax. 10.01 at 6:20 p. m.; †5100 sec. ft. cMax. 4.85 at 6:40 a. m.; 1600 sec. ft.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF LACKAWAXEN RIVER AT HAWLEY, WAYNE COUNTY, PA.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	*	255	4.45	2390	.....	260	5.92	2240	3.49	897	1.19	160	0.90	114	1.04	134	0.88	111
2,	.....	255	4.37	2300	.....	260	6.65	2720	3.14	738	1.06	141	1.04	134	0.89	113	0.73	90
3,	.....	255	3.87	1750	.....	260	6.07	2280	2.99	674	0.99	127	1.17	157	0.84	106	0.71	87
4,	.....	255	3.46	1300	.....	260	5.22	1820	2.84	614	1.31	184	0.95	121	0.80	100	0.68	84
5,	.....	255	3.69	1550	.....	260	4.10	1200	2.96	662	2.20	396	0.79	99	0.77	96	0.51	66
6,	.....	255	3.47	1310	.....	260	4.02	1160	4.04	1170	1.69	264	1.18	158	0.71	87	0.43	57
7,	.....	255	3.37	1200	.....	260	3.82	1060	3.64	969	1.26	174	1.11	146	0.69	85	0.56	70
8,	.....	255	2.97	812	.....	260	4.32	1310	3.17	751	2.41	461	1.28	178	0.60	74	0.64	79
9,	.....	255	2.85	711	.....	260	6.24	2440	3.51	907	1.93	322	1.24	170	0.50	64	0.65	80
10,	.....	255	2.99	827	.....	260	4.87	1520	2.89	634	1.51	224	1.05	136	0.74	92	0.60	74
11,	.....	255	2.88	734	.....	260	4.42	1370	2.96	662	1.31	184	‡3.91	1100	0.81	101	0.59	73
12,	.....	255	*	440	.....	260	4.34	1320	3.97	1130	1.21	164	3.30	808	‡2.03	348	0.63	78
13,	.....	255	.....	440	.....	260	4.18	1240	4.02	1160	1.18	158	3.05	699	1.22	166	0.10	32
14,	.....	255	.....	440	.....	260	3.74	1020	4.96	1670	0.86	106	2.55	507	0.98	125	0.63	78
15,	.....	255	.....	440	.....	260	3.48	892	4.24	1270	0.86	108	2.29	423	0.78	97	0.58	72
16,	.....	256	.....	440	.....	260	4.14	1220	3.69	993	0.89	113	1.94	324	0.73	90	0.50	64
17,	.....	255	.....	440	.....	260	3.97	1130	3.41	859	0.84	106	1.62	248	0.79	99	0.40	54
18,	.....	255	.....	440	.....	260	3.76	1020	2.94	654	0.73	97	1.57	237	0.88	111	0.36	51
19,	.....	255	.....	440	.....	260	3.57	936	2.71	564	0.66	81	1.78	285	0.91	115	0.25	42
20,	.....	255	.....	440	.....	260	3.98	1140	2.34	439	0.74	92	1.42	206	1.03	133	**0.36	51
21,	.....	255	.....	440	.....	260	4.72	1530	2.21	399	1.71	268	1.20	162	1.33	188	0.46	60
22,	.....	255	.....	440	.....	260	4.05	1170	2.02	346	1.14	151	1.11	146	1.26	174	0.37	52
23,	.....	255	.....	440	2.84	614	3.87	1080	1.84	300	0.79	99	1.01	130	0.87	110	0.26	43
24,	.....	255	.....	440	2.52	497	3.47	888	1.67	259	0.72	89	1.06	138	0.94	120	0.31	47
25,	.....	255	.....	440	2.44	471	3.44	873	1.51	224	1.31	184	1.14	151	0.97	124	0.47	61
26,	.....	255	.....	440	3.70	998	5.65	2070	1.24	170	0.96	122	1.35	192	0.76	94	0.32	48
27,	.....	255	.....	440	5.87	2210	5.45	1950	1.42	206	0.78	97	1.14	151	0.77	96	**0.35	50
28,	.....	255	.....	440	11.94	†6470	4.70	1520	1.96	320	0.75	93	1.10	144	0.71	87	0.38	52
29,	.....	255	.....	.....	9.17	†4510	4.07	1180	1.71	268	0.97	124	1.64	253	0.69	85	0.34	49
30,	.....	256	.....	.....	7.57	†3370	3.80	1050	1.37	196	1.01	130	1.43	208	**0.71	87	0.33	48
31,	.....	256	.....	.....	6.36	2520	.....	.....	1.19	160	.....	.....	1.17	157	0.72	89	.....	.....

†Estimated. ‡Max. 4.54 at 5 p. m.; 1430 sec. ft. §Max. 2.57 at 6.15 a. m.; 511 sec. ft. *River frozen Jan. 1-31 a. m. inclusive; Feb. 12-March 22 inclusive, and discharge estimated from Big Bushkill Creek at Shoemakers and Wallenpaupack Creek. **Interpolated.

ESTIMATED MONTHLY DISCHARGE OF LACKAWAXEN RIVER AT HAWLEY, WAYNE COUNTY, PA.

(Drainage area 290 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
a1913.					
January,	4400	.....	1010	3.483	4.016
February,	.....	.....	590	2.034	2.118
March,	5100	288	1046	3.607	4.158
April,	1260	290	734	2.531	2.824
May,	902	122	361	1.245	1.436
June,	276	63	121	0.417	0.465
July,	110	31	58	0.200	0.231
October,	330	†20	114	0.393	0.453
November,	1600	66	339	1.169	1.304
December,	507	125	270	0.931	1.073
b1914.					
January,	.....	.....	255	0.879	1.014
February,	2390	.....	799	2.755	2.869
March,	†6470	.....	883	3.045	3.510
April,	2720	873	1410	4.862	5.424
May,	1670	160	654	2.255	2.600
June,	461	81	167	0.576	0.643
July,	1430	99	261	0.900	1.038
August,	514	64	116	0.400	0.461
September,	111	32	63	0.217	0.242

a†Estimated. Although for 31 days in Aug. and Sept., zero gage heights were reported by the observer, the water was actually below zero and, for this reason, the discharge for these two months has not been published. Ice conditions Jan. 14 to Feb. 28th, discharge estimated from Big Bushkill Creek at Shoemakers and Lehigh River at Bethlehem.

b†Estimated. River frozen Jan. 1-31 a. m. inclusive; Feb. 12-March 22 inclusive, and discharge estimated from Big Bushkill Creek at Shoemakers and Wallenpaupack Creek at Wilsonville.

WALLENPAUPACK CREEK.

DESCRIPTION OF BASIN.

Wallenpaupack Creek, the largest and most important tributary of the Lackawaxen River, rises in the Pocono Plateau in the northern part of Monroe County, and flows in a general northeasterly direction forming the boundary between Pike and Wayne counties, for approximately 30 miles, to its mouth at Hawley, the total drainage area being 240 square miles, comprising 40 per cent. of the drainage area of the Lackawaxen River.

Its many tributaries generally rise in glacial lakes or swamps, and falling rapidly, join the main stream whose slope is very flat for many miles to within a mile of its mounth. Its source is at an elevation of 2,100 feet, and for 17 miles the slope is very steep,

Gaging Station on Wallenpaupack Creek at Wilsonville.

averaging 56 feet per mile to Ledgedale, 13 miles above the mouth. From Wilsonville, one mile above the mouth, it descends 285 feet to the Lackawaxen River over a series of falls and rapids, while above that point the fall is less than 10 feet in 12 miles, thus affording a fortunate combination for water storage and the generation of water power.

The valley below Ledgedale is wide and swampy, while the rolling hillsides are quite largely under cultivation. Along some of the tributaries, and in the main valley, is a certain amount of timber. The watershed is comparatively narrow for some 15 miles above its mouth, widening out above to follow its numerous upper tributaries in Wayne, Pike and Monroe counties. The drainage area is sparsely inhabited and contains practically no settlements.

The creek and its tributaries are not used for water supply purposes, and to a limited extent for water power below Wilsonville.

The mean annual precipitation over this watershed is approximately 43 inches.

The discharge has been measured since July 3, 1908, at Wilsonville, one mile above the mouth.

DELAWARE BASIN—STATION NO. 4.

WALLENPAUPACK CREEK AT WILSONVILLE, PA.

DESCRIPTION OF STATION.

LOCATION—At two span, steel, through-truss highway bridge, about 1¼ miles above the mouth, at Wilsonville, Pike County.

RECORDS AVAILABLE—Discharge from January, 1912, to September, 1914, and intermittent gage heights since 1909.

DRAINAGE AREA—240 square miles.

GAGE—A 12 foot staff gage is bolted to the downstream face of the pier. The elevation of zero is arbitrary. Bench Mark No. 1 is a small projection on right abutment, downstream corner, 5.2 feet down from bridge seat, elevation 3.923 feet above gage datum. Bench Mark No. 2 is highest point on round stone 3.3 feet from telegraph pole and 9.0 feet from downstream corner of right abutment, elevation 6.16 feet above gage datum. There is

also a Barrett & Lawrence automatic gage installed to the left of the pier, which supplements the readings taken from the staff gage.

WEIR AND DAM—There is a low log weir located a short distance downstream from the gage. Thirty-five feet above the gage is a 3 foot concrete dam, upon which flashboards are placed during periods of low flow in order to provide storage for the operation of the silk mills below.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is top edge of bridge seat, left abutment, downstream side.

CHANNEL—The channel is straight for 300 feet above and 200 feet below the station. The right bank overflows during extreme high stages. The left bank is not subject to overflow. The bed is composed of solid rock.

REMARKS—The discharge data have been computed from information furnished by L. B. Stillwell, Consulting Engineer, New York City.

DISCHARGE MEASUREMENTS OF WALLENPAUPACK CREEK AT WILSONVILLE, WAYNE COUNTY, PA.

(Drainage area 240 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
16	May 22	Hosmer, ...	116	293	1.24	1.80	362	0.6 msmt.
17	June 5	Hosmer & Wilson, ..	122	276	1.00	1.63	275	0.6 msmt.
18	June 24	Hosmer, ...	107	215	0.49	1.22	106	0.6 msmt.
19	Sept. 22	Taylor & Gough, ...	112	189	0.40	1.05	73	0.6 msmt.

DISCHARGE TABLE FOR WALLENPAUPACK CREEK AT WILSONVILLE, PIKE COUNTY, FROM JAN. 1, 1912, TO SEPT. 30, 1912.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
0.00	14	.90	149	.80	709	.70	1590	.60	3006
.10	17	1.00	180	.90	796	.80	1708	.70	3216
.20	23	.10	215	2.00	885	.90	1836	.80	3429
.30	32	.20	264	.10	977	3.00	1975	.90	3642
.40	44	.30	325	.20	1072	.10	2124	4.00	3855
.50	59	.40	393	.30	1170	.20	2284	.10	4068
.60	77	.50	467	.40	1270	.30	2454		
.70	98	.60	543	.50	1374	.40	2631		
.80	122	.70	624	.60	1480	.50	2809		

DISCHARGE TABLE FOR WALLENPAUPACK CREEK AT WILSONVILLE, PIKE COUNTY, FROM OCT. 1, 1912, TO SEPT. 30, 1913

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
0.00	12	.90	106	.80	675	.70	1735	.60	3140
.10	14	1.00	144	.90	768	.80	1876	.70	3316
.20	16	.10	184	2.00	868	.90	2020	.80	3500
.30	18	.20	230	.10	976	3.00	2168	.90	3689
.40	23	.30	284	.20	1092	.10	2321	4.00	3878
.50	31	.40	346	.30	1212	.20	2480	.10	4068
.60	43	.50	418	.40	1336	.30	2642		
.70	60	.60	500	.50	1465	.40	2806		
.80	81	.70	586	.60	1598	.50	2972		

DISCHARGE TABLE FOR WALLENPAUPACK CREEK AT WILSONVILLE, PIKE COUNTY, FROM OCT. 1, 1913, TO APRIL 30, 1914.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
0.80	1	.20	35	.60	150	2.00	348	.40	676
.90	4	.30	55	.70	192	.10	413	.50	800
1.00	10	.40	81	.80	240	.20	487	.60	950
.10	20	.50	113	.90	291	.30	573		

DISCHARGE TABLE FOR WALLENPAUPACK CREEK AT WILSONVILLE, PIKE COUNTY, FROM MAY 1, 1914.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
0.00	11	.60	25	.20	108	.80	362	.40	816
.10	12	.70	32	.30	130	.90	423	.50	912
.20	13	.80	41	.40	162	2.00	491		
.30	14	.90	52	.50	208	.10	564		
.40	16	1.00	66	.60	256	.20	639		
.50	20	.10	83	.70	307	.30	718		

ESTIMATED MONTHLY DISCHARGE OF WALLENPAUPACK CREEK AT WILSONVILLE, PIKE COUNTY.

(Drainage area 240 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
*a1912.					
January,	408	136	228	0.929	1.071
February,	559	77	191	0.796	0.859
March,	2450	215	863	3.596	4.146
April,	1480	584	890	3.708	4.137
May,	1120	198	570	2.375	2.73;
June,	240	59	129	0.538	0.580
October,	2720	144	595	2.479	2.858
November,	922	257	485	2.021	2.25[illegible]
December,	1340	284	714	2.975	3.430
*b1913.					
January,	2280	526	1180	4.917	5.669
February,	467	184	301	1.254	1.30;
March,	3970	257	1010	4.208	4.852
April,	1460	418	802	3.342	3.728
May,	1210	176	419	1.746	2.013
June,	382	70	130	0.542	0.60'
July,	.....	.....	54	0.225	0.260
August,	.....	.....	42	0.175	0.202
September,	.....	.....	64	0.267	0.298
October,	314	.....	141	0.588	0.678
November,	.....	53	367	1.529	1.70[illegible]
December,	530	192	278	1.158	1.335
The year,	.....	.....	399	1.663	22.651
*c1914.					
January,	573	150	210	0.875	1.009
February,	†2000	171	528	2.200	2.291
March,	†6770	150	916	3.817	4.401
April,	†2830	573	1350	5.625	6.276
May,	†1790	162	583	2.429	2.801
June,	822	80	149	0.621	0.693
July,	†1180	93	277	1.154	1.330
August,	162	34	80	0.333	0.384
September,	103	11	49	0.204	0.227

aFlashboards placed on dam. No gage readings taken June 30-Sept. 24 inclusive.
bFlashboards placed on dam, no readings taken July 1 to Sept. 30th; Oct. 8 to Oct. 20th; Nov. 10 to Nov. 19 inclusive. Discharge July 1 to Sept. 30; Oct. 8 to Oct. 20 and Nov. 10 to Nov. 19 inclusive, estimated by L. B. Stillwell, Cons. Engr., New York, N. Y.
cEstimated. Discharge for August estimated from gage heights and conditions of flashboards. Discharge for September 1, 2 and 4 from gage heights, remainder of month discharge estimated from gage heights and conditions of flashboards.
*The discharge as given above must be considered as a close approximation only, since intermittent storage interfered with the constant flow of the stream.

DELAWARE BASIN—STATION NO. 5.

LACKAWAXEN RIVER AT ROWLANDS, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, through-truss, steel, highway bridge, at Rowlands, Pike County.

RECORDS AVAILABLE—Discharge measurements and gage heights from June 4, 1914, to September 30, 1914.

DRAINAGE AREA—593 square miles.

GAGE—A standard chain gage is attached to the upstream handrail. The length of chain from bottom of weight to marker is 28.09 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is a point on face of upstream right wingwall, two feet from corner of abutment and four feet above ground, elevation 9.695 feet above gage datum. The gage is read twice daily by A. L. Finch.

DISCHARGE MEASUREMENTS—Taken from the upstream side of bridge. The initial point for soundings is left end of top angle iron which forms a part of lattice fence.

CHANNEL—The channel above the station is straight for 1,000 feet. Below the station it is straight for about 200 feet and then curves to the right. Both banks are high and not subject to overflow. The bed consists of coarse gravel and many large stones.

DISCHARGE MEASUREMENTS OF LACKAWAXEN RIVER AT ROWLANDS, PIKE COUNTY, PA.

(Drainage area 593 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
1	June 4	Hosmer & Wilson, ..	162	346	1.24	2.86	428	0.6 msmt.
2	Sept. 23	Taylor & Gough, ...	169	171	0.48	1.78	82	Surf. & 0.6 msmt.

DAILY MEAN GAGE HEIGHTS OF LACKAWAXEN RIVER AT ROWLANDS, PIKE COUNTY, PA.

1914.	JUNE.	JULY.	AUG.	SEPT.
DAY.	G H	G H	G H	G H
1,	.....	2.55	2.60	2.39
2,	.....	2.66	†2.50	2.31
3,	.....	2.73	2.40	2.34
4,	2.89	2.72	2.32	2.38
5,	3.59	†2.72	2.30	2.30
6,	3.23	2.73	2.32	†2.20
7,	2.95	2.70	2.13	2.11
8,	3.68	2.78	2.07	2.11
9,	3.41	2.84	†2.23	1.94
10,	3.09	2.67	2.39	1.96
11,	2.91	4.21	2.39	1.99
12,	2.78	†4.22	2.98	1.87
13,	2.72	4.22	2.73	†1.87
14,	2.61	3.87	2.49	1.87
15,	2.59	3.60	2.40	1.94
16,	2.52	3.32	†2.39	1.90
17,	2.49	3.06	2.37	1.69
18,	2.46	3.24	2.41	1.80
19,	2.39	†3.04	2.34	1.71
20,	2.42	2.85	2.50	†1.59
21,	†2.44	2.73	2.70	1.47
22,	2.46	2.57	2.80	1.74
23,	2.52	2.54	2.65	1.74
24,	2.56	2.55	2.49	1.77
25,	2.84	2.61	2.19	2.01
26,	2.56	†2.78	2.14	1.91
27,	2.45	2.76	2.12	†1.78
28,	†2.52	2.64	2.16	1.63
29,	2.58	3.90	2.15	1.66
30,	2.65	2.80	†2.29	1.65
31,	.....	2.71	2.44	.....

†Interpolated.

RATTLESNAKE BROOK.

DESCRIPTION OF BASIN.

Rattlesnake Brook is one of the largest tributaries of Shohola Creek, joining that stream about two miles above the falls, and about 8 miles above its mouth, coming in from the south and draining a wild and uninhabited area of about 13 square miles. The valley of this stream is flat and swampy for three or four miles above its mouth, then rises abruptly to its sources, which are at an elevation of about 1,600 feet above sea level, where it meets the headwaters of the Bushkill and Raymondskill creeks and flows in a general northerly direction to its mouth. The stream is approximately 8 miles long.

The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge has been measured since September 22, 1911, at the crossing of the Spring Brook road about two miles above the mouth of the stream.

DELAWARE BASIN—STATION NO. 6.

RATTLESNAKE BROOK AT SPRING BROOK, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, open wooden bridge, 2 miles above the mouth, on Spring Brook Road, Pike County.

RECORDS AVAILABLE—Discharge measurements and gage heights from September 22, 1911, to September 30, 1914.

DRAINAGE AREA—11 square miles.

GAGE—A sectional staff gage, 5½ feet long, is attached to the log abutment. The elevation of zero is arbitrary. Bench Mark No. 1 is on nail in root of swamp maple, 2 feet in diameter, 18 paces from center of bridge on right bank; nail in root facing road and nearest bridge, tree burned on side nearest road, also rotted on same side, elevation 4.05 feet above gage datum.

DISCHARGE MEASUREMENTS—Taken from the upstream side of the bridge, and by wading. The initial point for soundings is face of logs forming left abutment.

CHANNEL—The channel above and below the station is straight for approximately 30 feet and 80 feet respectively. Both banks are high and not subject to overflow. The bed is of gravel and mud.

DISCHARGE MEASUREMENTS OF RATTLESNAKE BROOK AT SPRING BROOK, PIKE COUNTY, PA.

(Drainage area 11 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914.		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
6	June 3,	Hosmer & Wilson,..	16	31	0.26	1.32	7.9	From bridge.
7	June 3,	Hosmer & Wilson,..	16	31	0.32	1.32	10.0	Surf. msmt.
8	June 25,	Hosmer, ...	16	38	0.34	1.52	13.0	0.6 msmt.
9	Sept. 23,	Taylor & Gough ....,	17	26	0.005	0.87	1.3	Surf. msmt.

DAILY MEAN GAGE HEIGHTS OF RATTLESNAKE BROOK AT SPRING BROOK, PIKE COUNTY, PA.

1914.	JAN.	FEB.	MAR.	APR.	MAY.	JUNE.	JULY.	AUG.	SEPT.
Day.	G H	G H	G H	G H	G H	G H	G H	G H	G H
1,	1.68	1.75	1.50	3.53	2.23	1.42	1.41	1.14	0.99
2,	*1.68	1.66	1.50	3.45	2.10	1.40	1.33	1.09	0.99
3,	1.69	1.63	1.49	3.35	2.04	1.35	1.27	1.04	0.95
4,	1.69	1.65	1.48	3.25	2.02	1.32	1.23	1.00	0.93
5,	1.67	1.91	1.47	3.08	2.20	1.52	1.19	1.00	0.92
6,	1.64	2.32	1.46	2.91	2.34	1.54	1.16	1.00	0.90
7,	1.62	2.46	1.45	2.63	2.26	1.40	1.15	1.00	0.89
8,	1.61	2.44	1.45	2.55	2.18	1.77	1.21	1.00	0.89
9,	1.60	2.38	1.44	3.18	2.06	1.54	1.17	1.00	0.89
10,	1.60	2.34	1.44	3.03	2.03	1.41	1.13	1.00	0.89
11,	1.59	2.42	1.41	2.73	2.01	1.31	1.11	1.14	0.89
12,	1.59	2.39	1.39	2.45	2.90	1.28	1.16	1.18	0.89
13,	1.58	2.38	1.37	2.35	2.91	1.24	1.20	1.09	0.89
14,	1.58	2.34	1.35	2.29	2.77	1.20	1.18	1.05	0.89
15,	1.57	2.33	1.33	2.25	2.57	1.18	1.36	1.09	0.89
16,	1.52	2.28	1.35	2.31	2.40	1.16	1.41	1.01	0.89
17,	1.43	2.20	1.39	2.41	2.07	1.12	1.38	1.02	0.89
18,	1.38	2.07	1.42	2.32	1.91	1.20	1.30	1.02	0.89
19,	1.39	1.99	1.49	2.25	1.89	1.20	1.21	1.00	0.89
20,	1.39	1.88	1.55	2.31	1.88	1.23	1.15	1.02	0.88
21,	1.38	1.83	1.62	2.29	1.82	1.19	1.13	1.20	0.87
22,	1.38	1.80	1.65	2.35	1.74	1.14	1.12	1.15	0.87
23,	1.38	1.79	1.68	2.33	1.71	1.13	1.11	1.05	0.87
24,	1.40	1.76	1.71	2.25	1.68	1.24	1.15	1.03	0.87
25,	1.42	1.68	1.73	2.31	1.64	1.36	1.11	1.00	0.89
26,	1.42	1.63	1.79	2.71	1.62	1.34	1.10	0.96	0.88
27,	1.44	1.61	1.83	2.81	1.59	1.32	1.09	0.94	0.87
28,	1.48	1.52	2.53	2.65	1.57	1.38	1.11	0.98	0.87
29,	1.50	.....	3.93	2.59	1.56	1.52	1.22	0.94	0.87
30,	1.56	.....	3.68	2.43	1.52	1.46	1.17	1.05	0.86
31,	1.66	.....	3.57	.....	1.51	.....	1.15	1.02	.....

*Creek frozen Jan. 2-27 inclusive, Feb. 7-Mar. 27 inclusive.

DELAWARE RIVER.

DESCRIPTION OF BASIN.

The Delaware River rises at elevation of about 1,900 feet above sea level, in two branches, in the Catskill Mountains of eastern New York, which flow southwesterly and unite at Hancock on the New York-Pennsylvania boundary, at an elevation of 895 feet. From this point a general southerly course is followed to the mouth in Delaware Bay, the river forming the eastern boundary of Pennsylvania, and dividing it from New York for 60 miles and from New Jersey for 170 miles.

The total length of the river is approximately 410 miles, and its drainage area above the Pennsylvania-Delaware line is 10,900 square miles. The major tributaries are the Lackawaxen, Lehigh and

Schuylkill rivers, and numerous large creeks from Pennsylvania; Neversink River from New York, and Flat Brook, Paulins Kill, Pequest, Lepatcong, Pohatcong and Muscenetong rivers from New Jersey.

Its upper section is in a mountainous, sparsely inhabited and well timbered region, continuing through northern Pennsylvania and New Jersey. After cutting through the Kittatinny Ridge at Delaware Water Gap it emerges into the broader valley below, where the population becomes more dense, and the land more largely cultivated.

Above Trenton, the head of tidewater, 30 miles above Philadelphia, the stream is generally swift and shallow, flowing on a rocky bed with numerous riffles and several considerable rapids. The slope from the northern boundary of New Jersey to Trenton is 3.5 feet per mile, and above this point to the Pennsylvania-New York line it averages 6 feet per mile. The upper section is in the once glaciated region and the tributaries drain numerous lakes, ponds and swampy areas throughout New York, upper Pennsylvania and New Jersey.

The stream is used considerably in its lower section for domestic and industrial supply in New Jersey and Pennsylvania, but the water power opportunities of the upper Delaware, although considerable, are undeveloped.

In Pennsylvania the cities of Philadelphia, Easton, and Chester lie on the river banks, while on tributaries are South Bethlehem, Allentown, Norristown, Pottstown, Reading, Pottsville and many smaller communities.

A portion of the anthracite coal region lies at the headwaters of the Schuylkill and Lehigh rivers, and a large limestone area is drained by the lower tributaries of these streams.

The Delaware basin in Pennsylvania is subject to an average annual precipitation of 46.1 inches, the upper part receiving 35 to 40 inches, and the major portion lying within the 45 to 50 inch zone. The area of highest precipitation in the State, 50 to 55 inches, lies at the headwaters of the Schuylkill River.

The discharge has been measured at Riegelsville, N. J., and Port Jervis, N. Y., the former since July 3, 1906, and the latter since October 12, 1904. A station was operated at Lambertville, N. J., from July 22, 1897, to April 1, 1908.

DELAWARE BASIN—STATION NO. 7.

DELAWARE RIVER AT PORT JERVIS, N. Y.

DESCRIPTION OF STATION.

LOCATION—On two span, steel, through-truss, highway bridge, between Port Jervis, N. Y., and Matamoras, Pa.

RECORDS AVAILABLE—Discharge complete from October 12, 1904, to September 30, 1914.

DRAINAGE AREA—3,250 square miles.

GAGE—A sloping and vertical staff gage on left bank and abutment was installed July 1, 1914. A standard chain gage is bolted to the downstream handrail, left span, near left abutment, and is only read under ice conditions. The elevation of zero is 414.89 feet above mean sea level. The length of chain from bottom of weight to marker is 36.33 feet. Bench Mark No. 1 is cross on door sill of school house on Thompson street, near Water street, Port Jervis, N. Y., elevation 27.75 feet above gage datum. Bench Mark No. 2 is top of downstream left corner of pier of toll bridge, elevation 29.92 feet above gage datum. Bench Mark No. 3 is top of right abutment of toll bridge at apex of angle caused by junction of downstream wingwall, elevation 29.02 feet above gage datum. The gage is read once daily by Jacob Miller.

DISCHARGE MEASUREMENTS—Taken from either the upstream or downstream side of the bridge. Initial point for soundings is top edge of bridge seat, Port Jervis abutment.

CHANNEL—The channel above and below the station is straight. Both banks are high and not subject to overflow. The bed is composed of gravel.

REMARKS—The following data have been furnished by the United States Geological Survey.

DISCHARGE MEASUREMENTS OF DELAWARE RIVER AT PORT JERVIS, N. Y.

(Drainage area 3,250 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914.		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
42	June 4.	Hosmer & Wilson. ...	542	1770	0.94	2.29	1672	0.6 msmt.
43	Sept. 19.	DeGolyer.	354	552	1.00	1.40	550	0.2 and 0.8 msmt.

DISCHARGE TABLE FOR DELAWARE RIVER AT PORT JERVIS, N. Y., FROM JAN. 1, 1912, TO MARCH 31, 1913.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
0.60	180	.50	4380	.40	16310	.30	37310	.20	60740
.70	225	.60	4670	.50	17290	.40	38090	.30	61560
.80	275	.70	4970	.60	17990	.50	38870	.40	62280
.90	330	.80	5280	.70	18600	.60	39650	.50	63000
1.00	390	.90	5600	.80	19220	.70	40430	.60	64020
.10	450	4.00	5930	.90	19850	.80	41220	.70	64840
.20	520	.10	6270	7.00	20500	.90	42010	.80	65660
.30	590	.20	6620	.10	21160	10.00	42800	.90	66480
.40	665	.30	6980	.20	21830	.10	43600	13.00	67300
.50	740	.40	7350	.30	22510	.20	44400	.10	68120
.60	825	.50	7730	.40	23200	.30	45200	.20	68940
.70	920	.60	8120	.50	23900	.40	46000	.30	69760
.80	1060	.70	8520	.60	24610	.50	46810	.40	70580
.90	1150	.80	8930	.70	25320	.60	47620	.50	71400
2.00	1280	.90	9350	.80	26040	.70	48440	.60	72220
.10	1420	5.00	9780	.90	26770	.80	49260	.70	73040
.20	1570	.10	10220	8.00	27500	.90	50080	.80	73860
.30	1730	.20	10670	.10	28240	11.00	50900	.90	74680
.40	1900	.30	11130	.20	28980	.10	51720	14.00	75500
.50	2080	.40	11590	.30	29720	.20	52540	15.00	84000
.60	2280	.50	12060	.40	30470	.30	53360	16.00	92700
.70	2450	.60	12540	.50	31220	.40	54180	17.00	101500
.80	2650	.70	13030	.60	31970	.50	55000	17.50	107660
.90	2860	.80	13540	.70	32720	.60	55820	18.00	110300
3.00	3080	.90	14060	.80	33480	.70	56640		
.10	3320	6.00	14590	.90	34240	.80	57460		
.20	3570	.10	15130	9.00	35000	.90	58280		
.30	3830	.20	15680	.10	35770	12.00	59100		
.40	4100	.30	16240	.20	36540	.10	59920		

Note.—This table is only applicable subsequent to Jan. 1, 1912, and is based on 8 discharge measurements made during 1911-1912, together with former curve.

DISCHARGE TABLE FOR DELAWARE RIVER AT PORT JERVIS, N. Y., FROM APRIL 1, 1913.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
1.00	330	.90	2980	.80	8930	.70	18600	.60	31970
.10	390	3.00	3080	.90	9350	.80	19220	.70	33720
.20	455	.10	3220	6.00	9790	.90	19850	.80	33480
.30	525	.20	3570	.10	10220	7.00	20500	.90	34240
.40	600	.30	3830	.20	10670	.10	21160	9.00	35000
.50	685	.40	4100	.30	11130	.20	21880	.10	35770
.60	780	.50	4380	.40	11590	.30	22510	.20	36540
.70	880	.60	4670	.50	12060	.40	23200	.30	37310
.80	990	.70	4970	.60	12540	.50	23900	.40	38090
.80	1110	.80	5280	.70	13030	.60	24610	.50	38870
2.00	1240	.90	5600	.80	13540	.70	25320	.60	39650
.10	1380	4.00	5930	.90	14060	.80	26040	.70	40430
.20	1530	.10	6270	6.00	14590	.90	26770	.80	41220
.30	1690	.20	6620	.10	15130	8.00	27500	.90	42010
.40	1860	.30	6980	.20	15680	.10	28240	10.00	42800
.50	2040	.40	7350	.30	16240	.20	28980		
.60	2230	.50	7730	.40	16810	.30	29720		
.70	2430	.60	8120	.50	17390	.40	30470		
.80	2640	.70	8520	.60	17990	.50	31230		

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF DELAWARE RIVER AT PORT JERVIS, N. Y.

1913.	JAN.		FEB		MAR.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.		OCT.		NOV.		DEC.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	5.5	12100	4.0	5930	7.0	20500	6.6	18000	4.7	8520	4.4	7350	1.5	685	1.3	525	1.2	455	1.4	600	2.6	2230	3.3	3330
2,	4.8	9980	4.1	6270	5.3	11100	6.2	15700	4.4	7350	4.0	5930	1.6	780	1.3	525	1.2	455	1.8	990	2.3	1690	3.2	3570
3,	4.6	8120	4.2	6620	4.4	7350	5.4	11600	4.1	6270	3.6	4670	1.3	525	1.3	525	1.2	455	2.2	1530	2.1	1380	3.1	3320
4,	8.0	27500	3.8	5230	4.2	6620	5.4	11600	4.0	5980	3.4	4100	1.4	600	1.2	455	1.1	390	1.6	780	2.1	1380	3.1	3320
5,	7.1	21200	3.4	4100	4.0	5930	5.5	12100	3.7	4970	4.2	6620	1.5	685	1.1	390	1.1	390	1.4	600	2.1	1380	3.1	3320
6,	6.0	14600	3.4	4100	3.8	5230	5.3	11100	3.7	4970	3.9	5600	1.7	880	1.1	390	1.1	390	1.6	780	2.1	1380	3.0	3080
7,	5.6	12500	3.2	3570	3.4	4100	4.9	9350	3.4	4100	3.2	3570	1.5	685	1.7	880	1.1	390	1.6	780	2.1	1380	3.0	3080
8,	5.6	12500	3.0	3080	3.1	3320	4.6	8120	3.3	3330	3.5	4330	1.5	685	1.2	455	1.1	390	1.6	780	2.1	1380	3.9	5600
9,	11.0	50900	3.0	3080	2.7	2450	4.4	7350	3.3	3330	3.2	3570	1.4	600	1.4	600	1.1	390	1.6	780	2.8	2840	3.9	5600
10,	7.8	26000	2.8	2650	3.3	3330	4.1	6270	3.3	3570	2.9	2960	1.4	600	1.2	455	1.1	390	1.6	780	9.7	40400	3.7	4970
11,	6.8	19200	2.9	2860	4.0	5930	4.1	6270	2.8	2840	2.7	2480	1.4	600	1.5	685	1.1	390	1.5	685	7.3	22500	3.7	4970
12,	6.7	18600	3.0	3080	4.5	7730	6.2	15700	2.7	2480	2.6	2230	1.4	600	1.3	525	1.1	390	1.6	780	6.1	15100	3.4	4100
13,	7.4	23200	2.7	2450	4.4	7350	5.2	10700	2.6	2230	2.6	2230	1.4	600	1.2	455	1.1	390	1.8	990	5.3	11100	3.4	4100
14,	7.0	20500	2.7	2450	4.3	6980	5.9	14100	2.6	2230	2.5	2040	1.4	600	1.2	455	1.1	390	1.7	880	4.7	8520	3.3	3830
15,	5.6	12500	2.7	2450	8.0	27500	5.6	12500	2.4	1860	2.3	1690	1.5	685	1.2	455	1.1	390	1.5	685	4.6	8120	3.4	4100
16,	5.3	11100	2.9	2260	7.3	23500	5.2	10700	2.4	1860	2.3	1690	1.4	600	1.2	455	1.1	390	1.5	685	4.3	6980	3.3	3830
17,	5.0	9780	2.9	2260	6.5	17400	4.9	9350	2.4	1860	2.2	1530	1.4	600	1.2	455	1.0	330	1.5	685	4.1	6270	3.3	3830
18,	5.9	14100	2.8	2260	5.7	13000	4.5	7730	2.4	1860	2.3	1690	1.4	600	1.2	455	1.0	330	1.5	685	3.8	5280	3.2	3670
19,	6.3	16200	2.8	2260	5.1	10200	4.4	7350	2.4	1860	2.2	1530	1.3	525	1.4	600	1.0	330	1.5	685	4.2	6620	3.2	3670
20,	6.1	15180	2.7	2450	4.9	9350	4.2	6620	2.4	1860	2.2	1530	1.3	525	1.3	525	1.0	330	1.6	780	4.0	5930	3.1	3320
21,	5.5	12100	2.7	2450	5.9	14100	3.9	5800	2.3	1690	2.2	1530	1.2	455	1.2	455	1.0	330	2.5	2040	3.9	5600	3.1	3320
22,	6.2	15700	2.7	2450	5.6	12500	3.7	4970	2.5	2040	2.2	1530	1.2	455	1.1	390	1.6	780	4.0	5930	3.8	5230	2.9	2960
23,	5.4	11600	3.2	3570	5.7	13000	3.5	4330	2.5	2040	2.2	1530	1.2	455	1.2	455	2.5	2040	3.4	4100	3.5	4330	2.9	2960
24,	5.2	10700	3.9	5600	5.2	10700	3.4	4100	3.3	5230	2.2	1530	1.3	525	1.2	455	2.7	2480	3.4	4100	3.4	4100	3.1	3320
25,	5.4	11600	4.0	5930	5.6	12500	3.0	3080	4.0	5980	2.0	1240	1.3	525	1.1	390	2.5	2040	3.6	4670	3.2	3570	3.3	3830
26,	5.0	9780	3.4	4100	5.7	13000	3.0	3080	3.3	5230	1.9	1110	1.3	525	1.1	390	1.9	1110	3.6	4670	3.1	3320	3.3	3830
27,	4.7	8520	3.0	3080	9.3	37300	3.0	3080	3.4	4100	1.8	990	1.3	525	1.0	330	1.7	880	4.0	5930	3.1	3320	3.1	3320
28,	4.5	7730	3.4	4100	15.0	84000	3.5	4330	3.3	3830	1.8	990	1.2	455	1.1	390	1.6	780	3.4	4100	3.1	3320	3.2	3570
29,	4.4	7350	....	.....	10.0	42000	5.5	12100	4.3	6980	1.7	880	1.4	600	1.1	390	1.5	685	3.3	3830	3.3	3830	3.2	3570
30,	4.0	5980	....	.....	7.9	26800	5.3	1110	5.3	13500	1.6	780	1.4	600	1.4	600	1.4	600	3.0	3080	3.4	4100	2.8	2640
31,	4.0	5930	....	.....	6.9	19800	....	.....	4.7	8520	....	.....	1.4	600	1.3	525	....	.....	2.3	2640	....	.....	2.7	2480

Gage heights and discharges, April to September inclusive, copied from 1913 report of New York Conservation Commission. Discharge estimated from Feb. 16 to Feb. 19 inclusive, due to ice conditions.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF DELAWARE RIVER AT PORT JERVIS, N. Y.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	3.1	3320	5.8	13540	.....	5000	8.8	33500	5.5	12100	2.5	2040	2.25	1610	1.95	1180	2.30	1690
2,	2.9	2860	6.5	17400	.....	5000	8.7	32700	5.0	9780	2.4	1860	2.25	1610	1.90	1110	2.20	1530
3,	2.8	2640	5.3	11100	.....	5000	9.3	37800	4.7	8520	2.3	1690	2.25	1610	1.80	990	2.15	1460
4,	2.7	2430	5.0	9780	.....	5000	7.8	28000	4.5	7730	2.3	1690	2.15	1460	1.70	880	2.20	1530
5,	2.6	2230	4.9	9350	.....	5000	7.0	20500	4.2	6620	2.1	1330	2.05	1310	1.65	830	2.20	1530
6,	2.6	2230	4.8	8930	.....	5000	6.5	17400	4.9	9350	3.0	3080	2.00	1240	1.49	676	2.10	1330
7,	2.6	2230	4.2	6620	.....	5000	5.8	13500	5.9	14100	2.8	2640	2.15	1460	1.50	695	1.95	1180
8,	2.4	1860	4.2	6620	.....	5000	6.0	14600	5.2	10700	2.6	2230	2.10	1330	1.50	695	1.90	1110
9,	2.7	2430	4.1	6270	.....	5000	11.0	50900	5.0	9780	3.1	3320	2.35	1780	1.46	651	1.80	990
10,	2.4	1860	4.1	6270	.....	5000	9.0	35000	4.9	9350	2.8	2640	2.45	1950	1.45	642	1.75	905
11,	2.3	1690	4.1	6270	.....	5000	6.7	18600	4.5	7730	2.8	2640	3.00	3080	1.48	668	1.70	880
12,	2.1	1330	2.8	2640	.....	5000	6.7	18800	4.6	8120	2.5	2040	3.50	4330	1.80	990	1.55	732
13,	2.1	1330	2.3	1690	.....	5000	6.6	18000	6.5	17400	2.3	1690	3.30	3830	2.05	1310	1.55	732
14,	.....	3250	2.3	1690	.....	5000	6.0	14600	6.5	17400	2.2	1530	3.00	3080	2.05	1310	1.48	668
15,	.....	3250	.....	3250	.....	4000	.....	5000	5.6	12500	6.1	15100	2.1	1330	2.70	2430	1.95	1180	1.50	695
16,	.....	3250	.....	3250	.....	4000	.....	5000	5.6	12500	5.9	14100	2.0	1240	2.60	2230	1.80	990	1.55	732
17,	3.2	3250	.....	3250	.....	4000	.....	5000	6.0	14600	5.4	11600	2.0	1240	2.40	1860	1.65	830	1.50	695
18,	3.1	3250	.....	3250	.....	4000	.....	5000	5.8	13500	5.0	9780	2.0	1240	2.55	2140	1.65	830	1.39	592
19,	.....	3250	.....	3250	.....	4000	.....	5000	5.4	11600	4.5	7730	1.9	1110	2.90	2860	1.70	880	1.33	548
20,	.....	3250	.....	3250	.....	4000	.....	5000	5.5	12100	4.4	7350	1.8	990	2.70	2430	1.95	1180	1.28	511
21,	.....	3250	.....	3250	.....	4000	.....	5000	9.1	35800	4.4	7350	1.9	1110	2.50	2040	2.80	2640	1.24	483
22,	.....	3250	.....	3250	.....	4000	.....	5000	8.4	30500	4.1	6270	1.8	990	2.20	1530	4.10	6270	1.15	422
23,	.....	3250	.....	3250	.....	4000	.....	5000	7.9	26800	3.4	4100	1.8	990	2.10	1330	3.10	3820	1.24	483
24,	.....	3250	.....	3250	.....	4000	4.9	9350	6.0	14600	3.2	3570	2.5	2040	2.15	1460	3.00	3080	1.36	570
25,	.....	3250	.....	3250	.....	4000	4.6	8120	5.7	13000	3.1	3320	2.2	1530	2.10	1330	2.85	2750	1.21	462
26,	.....	3250	.....	3250	.....	4000	4.1	6270	5.7	13000	2.9	2860	2.0	1240	2.20	1530	2.60	2230	1.23	476
27,	.....	3250	.....	3250	.....	4000	7.7	25300	7.2	21800	2.9	2860	2.0	1240	2.15	1460	2.70	2430	1.22	469
28,	.....	3250	.....	3250	.....	4000	16.0	92700	6.4	16800	3.1	3320	1.9	1110	2.05	1310	2.25	1610	1.17	436
29,	.....	3250	.....	3250	.....	.....	14.2	77200	5.9	14100	2.8	2640	1.9	1110	2.15	1460	2.15	1460	1.15	422
30,	.....	3250	.....	3250	.....	.....	9.3	36500	5.6	12500	2.4	1860	2.1	1330	2.20	1530	2.10	1330	1.20	455
31,	.....	3250	.....	3250	.....	.....	9.2	36500	.....	.....	2.6	2230	.....	.....	2.05	1310	2.25	1610	.....	.....

Gage heights suspended on account of ice Jan. 14-31 and Feb. 15 to Mar. 23 inc. Mean discharge estimated as follows: Jan. 14-31, 3,250 sec. ft.; Feb. 15-28, 4,000 sec. ft.; Mar. 1-23, 5,000 sec. ft.

ESTIMATED MONTHLY DISCHARGE OF DELAWARE RIVER AT PORT JERVIS, N. Y.

(Drainage area 3,250 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum	Minimum	Mean.	Second-feet per square mile.	Depth in inches.
a1913.					
January,	50200	5930	14900	4.58	5.28
February,	6820	.....	3600	1.11	1.16
March,	84000	2450	15600	4.80	5.53
April,	19000	3080	8940	2.75	3.07
May,	13500	1860	4300	1.32	1.53
June,	7350	730	2640	.812	.91
July,	880	455	593	.183	.21
August,	880	330	485	.149	.17
September,	2430	330	648	.199	.22
October,	5930	600	1970	.606	.70
November,	40400	1380	5750	1.77	1.98
December,	5600	2430	3690	1.14	1.31
The year,	84000	330	5250	1.61	22.06
b1914.					
January,	.....	.....	2820	0.868	1.00
February,	17400	.....	5660	1.80	1.87
March,	92700	.....	13100	4.03	4.65
April,	50900	11600	20900	6.43	7.17
May,	17400	1860	8220	2.53	2.92
June,	3320	990	1740	0.536	0.60
July,	4280	1240	1940	0.597	0.69
August,	6270	643	1530	0.471	0.54
September,	1690	423	826	0.254	0.28

aGage heights and discharges, April to September inclusive, copied from 1913 report of New York Conservation Commission. Discharge estimated from Feb. 16 to Feb. 19 inclusive, due to ice conditions.

bGage heights suspended on account of ice Jan. 14 to 31, and Feb. 15 to March 23 inclusive. Mean discharge estimated as follows: Jan. 14 to 31, 3250 sec. ft.; Feb. 15 to 28, 4000 sec. ft.; March 1 to 23, 5000 sec. ft.

BIG BUSHKILL CREEK.

DESCRIPTION OF BASIN.

Big Bushkill Creek, a large tributary of the Delaware River in Monroe and Pike counties, drains an area of approximately 150 square miles. Rising in many lakes and ponds on the Pocono Plateau in the south central part of Pike County, it flows southerly through an uninhabited region covered with heavy second growth and some virgin timber, to within a few miles of its mouth at Bushkill, the length being approximately 25 miles. The principal tributaries are Wells, Middle Bushkill and Little Bushkill creeks, the watershed including many lakes, ponds and swamps, and lying entirely within the glacial area. On Bushkill Creek and its tributaries are numerous falls and rapids, most noted of which are Bushkill Falls on Little

Bushkill Creek, and Winona Falls on the main stream, all the streams being rapid below the falls, flowing over rocky beds within steep, precipitous banks, while above the slopes flatten and swampy areas abound. Bushkill Village, at its mouth, is the only town within this basin. This creek and its tributaries are used to some extent on the lower reaches for power purposes by grist mills, while sites for considerable powers are as yet undeveloped.

The mean annual precipitation over this watershed is from 45 to 50 inches.

The discharge has been measured since September 19th, 1908, at Shoemakers, 3 miles above the mouth.

DELAWARE BASIN—STATION NO. 8.

BIG BUSHKILL CREEK AT SHOEMAKERS, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, steel, through-truss, highway bridge, 2 miles upstream from Bushkill, Pike County, and 2½ miles above the mouth.

RECORDS AVAILABLE—Discharge complete from September 19, 1908, to September 30, 1914.

DRAINAGE AREA—115 square miles.

GAGE—A standard chain gage is fastened to the handrail on the upstream side of the bridge. The length of chain from bottom of weight to marker is 17.30 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is point on upstream corner of left abutment, top of fifth course from bottom, eighth course down from top of bridge seat, elevation 5.625 feet above gage datum. The gage is read once daily by George Beaver.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge, and by wading at section about 2,000 feet below bridge. The initial point for soundings is end of handrail at left bank.

CHANNEL—The channel is straight for 300 feet above and 800 feet below the station. Both banks are high and not subject to overflow. The bed is composed of rocks and gravel.

REMARKS—Saw Creek enters from the left a few hundred feet above the station.

DISCHARGE MEASUREMENTS OF BIG BUSHKILL CREEK AT SHOEMAKERS, MONROE COUNTY, PA.

(Drainage area 115 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914.		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
12	June 2,	Hosmer & Wilson,..	94	93	1.46	1.69	136	0.6 method.
13	Aug. 19,	Bowen & Brady, ...	48	46	0.69	1.25	31	Wading msmt.

DISCHARGE TABLE FOR BIG BUSHKILL CREEK AT SHOEMAKERS, MONROE COUNTY, FROM SEPT. 19, 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
0.90	6	.80	160	.70	596	.60	1455	.50	2447
1.00	12	.90	195	.80	672	.70	1565	.60	2555
.10	20	2.00	233	.90	750	.80	1675	.70	2665
.20	31	.10	273	3.00	838	.90	1785	.80	2775
.30	44	.20	317	.10	928	4.00	1895	.90	2885
.40	60	.30	364	.20	1025	.10	2005	5.00	2995
.50	79	.40	415	.30	1130	.20	2115		
.60	102	.50	469	.40	1237	.30	2225		
.70	128	.60	529	.50	1346	.40	2335		

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF BIG BUSHKILL CREEK AT SHOEMAKERS, MONROE COUNTY, PA.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	2.38	405	2.88	734	2.15	295	3.49	1340	2.39	410	1.74	141	1.45	70	1.52	84	1.26	39
2,	2.56	505	2.58	517	2.31	322	3.29	1120	2.31	369	1.70	128	1.80	160	1.45	70	1.23	35
3,	2.50	469	2.48	458	2.33	405	3.19	1020	2.26	345	1.65	115	1.70	128	1.42	64	1.20	31
4,	2.43	431	2.43	431	2.28	355	3.14	967	2.22	326	1.87	184	1.65	115	1.40	60	1.18	29
5,	2.38	405	2.34	354	2.24	336	2.82	688	2.28	355	1.94	210	1.48	75	1.40	60	1.15	26
6,	2.36	395	2.30	364	2.18	308	2.67	576	2.49	464	1.79	157	1.45	70	1.38	57	1.13	23
7,	2.30	364	2.38	405	2.08	265	2.54	493	2.44	437	1.73	138	1.50	79	1.33	49	1.12	22
8,	2.08	245	2.30	364	2.00	233	2.49	464	2.31	369	1.71	131	1.65	115	1.56	93	1.12	22
9,	1.98	225	2.18	308	1.98	206	3.09	919	2.29	359	1.69	125	1.55	90	1.39	58	1.10	20
10,	1.94	210	2.16	299	1.88	188	2.86	719	2.19	313	1.66	118	1.53	86	1.34	50	1.10	20
11,	1.88	188	2.10	273	1.82	167	2.69	589	2.17	304	1.59	100	1.70	128	1.31	46	1.09	19
12,	1.88	188	2.03	245	1.68	122	2.61	536	2.34	384	1.52	84	1.58	97	1.30	44	1.06	18
13,	2.18	308	2.32	374	1.63	110	2.49	464	2.69	589	1.49	77	1.45	70	1.30	44	1.06	17
14,	*2.66	589	2.43	431	1.80	102	2.46	417	2.67	576	1.45	70	1.45	70	1.27	40	1.05	16
15,	2.48	458	2.31	369	1.86	181	2.41	420	2.53	487	1.41	62	1.80	102	1.25	38	1.05	16
16,	2.44	437	2.28	355	2.01	237	2.52	481	2.51	475	1.39	58	1.50	79	1.23	34	1.05	16
17,	2.33	379	2.36	395	2.23	331	2.49	464	2.39	410	1.36	54	1.46	71	1.19	30	1.02	14
18,	†	275	2.48	458	2.28	355	2.39	410	2.32	374	1.34	50	1.35	53	1.17	28	1.02	14
19,	.....	275	2.48	458	2.24	336	2.33	379	2.34	336	1.32	47	1.33	49	1.21	32	1.00	12
20,	.....	275	2.46	447	2.18	308	2.29	359	2.21	322	1.44	68	1.31	46	1.60	100	1.00	12
21,	.....	275	2.43	431	2.10	273	2.57	511	2.14	291	1.42	64	1.30	44	1.58	97	1.00	12
22,	.....	275	2.58	517	2.01	237	2.49	464	2.06	257	1.41	62	1.37	55	1.45	70	1.00	12
23,	.....	275	2.64	556	1.98	225	2.44	437	2.04	249	1.39	58	1.30	44	1.32	47	1.00	12
24,	.....	275	2.66	569	1.98	225	2.29	359	1.99	229	1.37	55	1.40	60	1.30	44	1.00	12
25,	.....	275	2.68	583	1.93	206	2.33	379	1.94	210	1.49	77	1.70	128	1.28	35	1.08	18
26,	.....	275	2.56	505	2.18	308	2.59	523	1.89	192	1.44	68	1.75	144	1.20	31	1.05	16
27,	.....	275	2.43	458	2.73	619	2.69	589	1.85	178	1.39	58	1.56	93	1.19	30	1.03	14
28,	.....	275	2.23	331	3.53	1430	2.67	576	2.09	269	1.49	77	1.53	86	1.16	27	1.02	14
29,	.....	275	.....	.....	3.88	1760	2.49	464	1.99	229	1.59	84	1.90	196	1.25	38	1.02	14
30,	.....	275	.....	.....	3.31	1140	2.45	442	1.94	210	1.49	77	1.85	178	1.33	47	1.02	14
31,	.....	275	.....	.....	3.18	1010	.....	.....	1.82	167	.....	.....	1.60	102	1.31	46	.....	.....

*Gorge below gage. †Creek frozen Jan. 18-31 inclusive and discharge estimated from climatological records.

ESTIMATED MONTHLY DISCHARGE OF BIG BUSHKILL CREEK AT SHOEMAKERS, MONROE COUNTY.

(Drainage area 115 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	569	188	324	2.817	3.248
February,	734	245	429	3.730	3.884
March,	1760	102	406	3.530	4.070
April,	1340	359	587	5.104	5.694
May,	589	167	338	2.939	3.388
June,	210	47	95	0.826	0.922
July,	160	44	93	0.809	0.933
August,	102	27	51	0.443	0.511
September,	39	12	19	0.165	0.184

Creek frozen Jan. 18-31 inclusive, and discharge estimated from climatological records.

ANALOMINK CREEK.

DESCRIPTION OF BASIN.

Analomink, sometimes called Holler Creek, and also known as West Branch of Brodheads Creek, is a tributary of Brodheads Creek in the central part of Monroe County, lying almost entirely within Paradise Township, and draining an area of approximately 45 square miles. This stream rises in three branches, Paradise, Holler and Swiftwater creeks, in the Pocono Mountains, following from their junction a general southeasterly direction for approximately 10 miles to its mouth in Brodheads Creek, one mile above Analomink. The watershed is sparsely inhabited, being covered with second growth timber except for small agricultural areas. The slope is generally steep, except at the junction of the three branches where the valley widens for a short distance, from which point it continues with a steep slope to its mouth. It lies entirely within the glacial area. One or two small water power plants are operated during the summer, and two water works systems obtain supplies from springs at the headwaters. The average yearly rainfall over this watershed is from 45 to 50 inches.

The discharge has been measured since September 16th, 1908, at Henryville, 2½ miles above the mouth.

DELAWARE BASIN—STATION NO. 9.

ANALOMINK CREEK AT HENRYVILLE, PA.

DESCRIPTION OF STATION.

LOCATION—At single span, highway bridge, one mile above railroad station at Analomink, Monroe County.

RECORDS AVAILABLE—Discharge complete from September 16, 1908, to December 31, 1911, and February 17, 1913, to September 30, 1914.

DRAINAGE AREA—35 square miles.

GAGE—A 10 foot staff gage is spiked to a tree on right bank, 500 feet above bridge. The elevation of zero is aribtrary. Bench Mark No. 1 is spike in root of a large walnut tree just downstream from gage on right bank, 43 paces upstream from upstream end of laundry building, elevation 7.045 feet above gage datum. The gage is read twice daily by George Henry.

DISCHARGE MEASUREMENTS—Taken from the downstream side of bridge at high stages. By wading above bridge at normal and low stages. The initial point for soundings is right end of top channel of downstream handrail.

CHANNEL—The channel is straight for 200 feet above and 200 feet below the station. Both banks are high and not subject to overflow. The bed is composed of gravel.

DISCHARGE MEASUREMENTS OF ANALOMINK CREEK AT HENRYVILLE, MONROE COUNTY, PA.

(Drainage area 35 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914.		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
12	Jan. 7,	Reckord & Brown, ..	53	29	1.78	0.75	52	From bridge.
13	June 2,	Hosmer & Wilson, ...	40	35	1.00	0.63	35	Wading msmt 100 feet above bridge.
14	Aug. 20,	Bowen & Brady, ...	38	30	0.60	0.55	18	Wading msmt 100 feet above bridge.

DISCHARGE TABLE FOR ANALOMINK CREEK AT HENRYVILLE, MONROE COUNTY, FROM SEPT. 16, 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
0.30	8	1.00	119	.70	356	.40	650	.10	976
.40	12	.10	147	.80	395	.50	696	.20	1023
.50	20	.20	178	.90	436	.60	742	.30	1070
.60	33	.30	209	2.00	477	.70	789		
.70	48	.40	243	.10	519	.80	835		
.80	68	.50	280	.20	561	.90	882		
.90	92	.60	318	.30	605	3.00	929		

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF ANALOMINK CREEK AT HENRYVILLE, MONROE COUNTY, PA.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	0.84	78	1.18	172	.....	55	1.54	295	0.97	111	0.82	73	0.45	16	0.50	20	0.45	16
2,	0.83	75	1.18	172	.....	55	1.54	295	0.97	111	0.78	64	0.45	16	0.48	18	0.40	12
3,	0.83	75	1.01	122	.....	55	1.47	269	0.97	111	0.72	52	0.40	12	0.45	16	0.40	12
4,	0.87	85	1.03	127	.....	55	1.44	258	0.97	111	0.75	58	0.50	20	0.44	15	0.40	12
5,	0.91	95	0.98	114	.....	55	1.42	250	0.97	111	0.75	58	0.50	20	0.45	16	0.40	12
6,	0.84	78	0.98	114	.....	55	1.24	190	0.97	111	0.65	40	0.40	12	0.42	14	0.40	12
7,	0.84	78	1.11	150	.....	55	1.22	184	0.92	97	0.60	32	0.40	12	0.45	16	0.40	12
8,	0.85	80	0.98	114	.....	55	1.22	184	0.92	97	0.60	32	0.40	12	0.42	14	0.40	12
9,	0.87	85	1.13	156	.....	55	1.22	184	0.92	97	0.60	32	0.55	26	0.45	16	0.40	12
10,	0.87	85	1.08	141	.....	55	1.24	190	0.94	103	0.60	32	0.50	20	0.40	12	0.40	12
11,	0.88	87	1.03	127	.....	55	1.22	184	0.92	97	0.60	32	0.50	20	0.40	12	0.40	12
12,	0.89	90	*	60	.....	55	1.22	184	1.42	250	0.60	32	0.68	45	0.40	12	0.40	12
13,	*	50	.....	60	.....	55	1.19	175	1.32	216	0.60	32	0.70	48	0.40	12	0.40	12
14,	.....	50	.....	60	.....	55	1.16	166	1.27	200	0.60	32	0.60	32	0.42	14	0.40	12
15,	.....	50	.....	60	.....	55	1.20	178	1.14	159	0.60	32	0.58	30	0.48	18	0.40	12
16,	.....	50	.....	60	.....	53	1.24	190	1.12	153	0.60	32	0.52	22	0.42	14	0.40	12
17,	.....	50	.....	60	1.25	193	1.17	169	1.12	153	0.58	30	0.50	20	0.45	16	0.40	12
18,	.....	50	.....	60	1.18	172	1.14	159	1.11	150	0.55	26	0.50	20	0.42	14	0.40	12
19,	.....	50	.....	60	1.13	156	1.22	184	1.10	147	0.50	20	0.58	30	0.45	16	0.40	12
20,	.....	50	.....	60	1.01	122	1.17	169	1.08	141	0.50	20	0.55	26	0.53	24	0.40	12
21,	.....	50	.....	60	0.98	114	1.12	153	1.08	141	0.50	20	0.50	20	0.50	20	0.40	12
22,	.....	50	.....	60	1.01	122	1.07	139	1.07	139	0.45	16	0.50	20	0.50	20	0.40	12
23,	.....	50	.....	60	0.98	114	1.07	139	1.02	125	0.40	12	0.48	18	0.46	17	0.40	12
24,	.....	50	.....	60	1.03	127	1.02	125	1.00	119	0.40	12	0.50	20	0.45	16	0.40	12
25,	.....	50	.....	60	0.93	100	0.98	114	1.00	119	0.40	12	0.50	20	0.45	16	0.40	12
26,	.....	50	.....	60	0.98	114	0.99	116	0.97	111	0.40	12	0.50	20	0.45	16	0.40	12
27,	.....	50	.....	60	1.08	141	1.02	125	1.04	130	0.40	12	0.48	18	0.45	16	0.40	12
28,	.....	50	.....	60	2.05	498	1.10	147	1.17	169	0.40	12	0.65	40	0.45	16	0.40	12
29,	.....	50	.....	.....	1.63	329	0.92	97	1.10	147	0.40	12	0.55	26	0.45	16	0.40	12
30,	2.38	641	.....	.....	1.71	360	0.97	111	1.04	130	0.40	12	0.50	20	0.45	16	0.40	12
31,	1.71	360	.....	.....	1.73	368	.....	.....	0.92	97	.....	.....	0.50	20	0.45	16	.....	.....

*Creek assumed frozen Jan. 13-29 inclusive; Feb 12-March 16 inclusive and discharge estimated from Pocono Creek near Stroudsburg.

ESTIMATED MONTHLY DISCHARGE OF ANALOMINK CREEK AT HENRYVILLE, MONROE COUNTY.

(Drainage area 35 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	641	.....	92	2.629	3.031
February,	172	.....	90	2.571	2.677
March,	498	.....	126	3.600	4.150
April,	295	97	177	5.057	5.642
May,	250	97	134	3.829	4.415
June,	73	12	30	0.857	0.956
July,	48	12	23	0.657	0.757
August,	24	12	16	0.458	0.528
September,	16	12	12	0.343	0.382

Note.—Creek assumed frozen from Jan. 13-29 inclusive, Feb. 12-March 16 inclusive, and discharge estimated from Pocono Creek near Stroudsburg.

POCONO CREEK.

DESCRIPTION OF BASIN.

Pocono Creek, the largest tributory of McMichaels Creek, lies in the south central part of Monroe County, draining an area of approximately 42 square miles. It rises in the Pocono Mountains in the central part of the county, flowing in a general southerly direction through an uninhabited area, covered with second growth timber, to a point about 6 miles west of Stroudsburg, where it turns in an easterly direction through a farming section, to its mouth in the center of the town, a total distance of approximately 12 miles. In its upper sections the slope of the stream is steep, while in the lower section it is much flatter, and it lies entirely within the glacial area. A few grist mills operated by water power exist on the lower sections of this creek.

The mean annual precipitation over this watershed is from 45 to 50 inches.

The discharge has been measured since August 3, 1911, at the Spoke Factory Bridge, near Stroudsburg, 2 miles above the mouth.

DELAWARE BASIN—STATION NO. 10.

POCONO CREEK NEAR STROUDSBURG, PA.

DESCRIPTION OF STATION.

LOCATION—On covered wooden bridge about 2 miles above Stroudsburg, near spoke factory.

RECORDS AVAILABLE—Discharge complete from August 3, 1911, to September 30, 1914.

DRAINAGE AREA—38 square miles.

GAGE—A sectional chain gage is fastened to the upstream guardrail near the left bank. The elevation of zero is arbitrary. The length of chain from the bottom of the weight to the marker is 13.99 feet. Bench Mark No. 1 is a large staple on the inside of the right upstream one of a pair of angling wooden braces, elevation 15.73 feet above gage datum. Bench Mark No. 2 is top of flat stone on top of face of left abutment, near upstream corner, below angle between upstream side of wooden bridge and end of wingwall guard wall, about 10 inches from side of bridge, elevation 10.67 feet above gage datum. The gage is read twice daily by G. K. Brands.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge, and by wading. The initial point for soundings is face of downstream abutment, right end looking downstream.

CHANNEL—The channel above the station curves to the right for about 600 feet. The channel below the station is straight for 450 feet. Both banks are high and do not overflow. The bed is composed of small stones and gravel.

REMARKS—During extreme stages some water passes around the bridge, which happens about once or twice a year.

DISCHARGE MEASUREMENTS OF POCONO CREEK NEAR STROUDSBURG, MONROE COUNTY, PA.

(Drainage area 38 square miles).

No.	Date.	Hydrographer.	Width.	Area of section	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914.		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
8	Jan. 8,	Roehringer & Shade.	41	32	2.16	2.68	69	
9	June 1,	Hosmer & Wilson, ...	30	27	1.24	2.39	33	Wading msmt. 100 feet below bridge.
10	Aug. 19,	Bowen & Brady, ...	22	17	0.88	2.04	15	Wading msmt.

DISCHARGE TABLE FOR POCONO CREEK NEAR STROUDSBURG, MONROE COUNTY, FROM AUGUST 10, 1911.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1.80	9	.50	47	.20	137	.90	310	.60	607
.90	12	.60	57	.30	156	4.00	344	.70	660
2.00	15	.70	68	.40	177	.10	380	.80	716
.10	19	.80	80	.50	199	.20	420	.90	776
.20	24	.90	92	.60	223	.30	462	5.00	845
.30	30	3.00	106	.70	249	.40	507	.10	920
.40	38	.10	121	.80	278	.50	556	.20	1005

DELAWARE BASIN—STATION NO. 11.

McMICHAELS CREEK NEAR STROUDSBURG, PA.

DESCRIPTION OF STATION.

LOCATION—On railroad bridge of W. B. and Eastern R. R. near car shops above Stroudsburg, Monroe County.

RECORDS AVAILABLE—Discharge complete from August 10, 1911, to September 30, 1914.

DRAINAGE AREA—60 square miles.

GAGE—A sectional chain gage is attached to the guardrail on second panel from left downstream side. The length of chain from the bottom of the weight to the marker is 23.00 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is cut on top of extreme upstream stone in the upstream wingwall of the right abutment, on top of the fourth stone down from the bridge seat, and is on the extreme upper outer corner, elevation 13.56 feet above gage datum. The gage is read twice daily by A. W. Marvin.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge, or by wading below the bridge. The initial point for soundings is the face of the left abutment.

CHANNEL—The channel is straight for 100 yards above and 50 yards below the station, and passes under the bridge at a slight angle to the right. Both banks are high and do not overflow. The bed is composed of stones and mud.

DISCHARGE MEASUREMENTS OF McMICHAELS CREEK AT CAR SHOPS ABOVE STROUDSBURG, MONROE COUNTY, PA.

(Drainage area 60 square miles).

No.	Date.	Hydrographer.	Width.	Area of section	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914.		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
8	Jan. 8,	Boehringer & Shade,	68	172	0.60	3.46	103	From bridge.
9	June 1,	Hosmer & Wilson, ..	66	141	0.53	3.25	75	0.6 msmt.
10	Aug. 19,	Bowen & Brady, ...	68	81	0.47	3.05	38	Wading 600 feet below station.

DISCHARGE TABLE FOR McMICHAELS CREEK AT CAR SHOPS ABOVE STROUDSBURG, MONROE COUNTY, FROM AUG. 10, 1911.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
2.80	18	.40	100	4.00	258	.60	492	.20	850
.90	23	.50	120	.10	282	.70	540	.30	923
3.00	40	.60	142	.20	326	.80	592	.40	1010
.10	52	.70	166	.30	364	.90	648	.50	1100
.20	66	.80	194	.40	404	5.00	710		
.30	82	.90	224	.50	446	.10	778		

augmenting the dry weather flow. From the west, where the Lehigh passes the anthracite coal fields, the tributaries bring in quantities of culm and mine water.

The chief tributaries are Tobyhanna, Bear, Black, Mahoning, Big, Lizard, Aquashicola, Jordan, Little Lehigh, Monocacy and Saucon creeks.

The banks, especially in the upper portion, are high and rocky, and below Mauch Chunk and White Haven the valley assumes the nature of a gorge. The bed is rock throughout most of its length, in places overlain by a thin layer of drift, and in its lower section, behind the navigation dams, extensive silting has taken place.

The Lehigh Coal and Navigation Company operates a canal and slack-water system of navigation on the lower 45 miles, consisting of 10 dams and locks, and several short sections of canal connecting the pools. Considerable water power is developed along this canal.

Numerous towns and industries in the lower section, in which portion of the valley population and industries are quite congested, use the river water for domestic and industrial purposes, but its impure condition and high sediment content, make purification a requisite.

The basin, which is long and narrow, is subject to an annual precipitation of 45 to 50 inches.

The discharge has been measured from September 22, 1902, to February 13, 1905, and from April 26, 1909, to date, at South Bethlehem, 12 miles above the mouth, and since June 24, 1914, at Tannery, Carbon County.

DELAWARE BASIN—STATION NO. 12.

LEHIGH RIVER AT TANNERY, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, steel, through-truss, highway bridge, at Tannery, Carbon County.

RECORDS AVAILABLE—Discharge measurements and gage heights from June 24, 1914 to September 30, 1914.

DRAINAGE AREA—335 square miles.

GAGE—A standard chain gage is fastened to the downstream hand-rail. The elevation of zero is arbitrary. The length of chain from

Gaging Station on Lehigh River at Tannery.

the bottom of weight to marker is 40.73 feet. Bench Mark No. 1 is on downstream corner of left abutment, top of first course above ground or 9th course below bridge seat, elevation 17.11 feet above gage datum. Bench Mark No. 2 is on the downstream outer corner of stone at elevation of bridge seat vertically above B. M. No. 1, elevation 31.63 feet above gage datum. The gage is read twice daily by Howard Flick.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is top face of (old) right abutment.

CHANNEL—The channel above and below the station is straight for 500 feet and 200 feet respectively. Both banks are high and not subject to overflow. The bed is composed of large stones and gravel.

DISCHARGE MEASUREMENTS OF LEHIGH RIVER AT TANNERY, CARBON COUNTY, PA.

(Drainage area 335 square miles).

No.	Date.	Hydrographer.	Width.	Area of section	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914.		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
1	May 4.	Boehringer,	71	202	4.94	4.35	997	0.6 msmt.
2	May 29.	Taylor,	68	167	2.85	3.76	476	0.2 & 0.8 msmt.
3	June 23.	Hosmer,	52	139	1.53	3.05	213	0.6 msmt.
4	Sept. 21.	Taylor & Gough,	55	126	1.34	2.92	169	0.6 msmt.

DAILY MEAN GAGE HEIGHTS OF LEHIGH RIVER AT TANNERY, CARBON COUNTY, PA.

1914.	JUNE	JULY.	AUG.	SEPT.
DAY.	G H	G H	G H	G H
1,		3.13	3.59	3.25
2,		3.52	†3.53	3.20
3,		3.47	3.47	3.14
4,		3.36	3.37	3.18
5,		†3.28	3.32	3.11
6,		3.21	3.26	†3.09
7,		3.31	3.24	3.07
8,		3.99	3.34	3.03
9,		3.65	†3.36	2.98
10,		4.03	3.37	2.90
11,		5.64	3.59	2.90
12,		†4.92	3.65	2.87
13,		4.20	3.73	†2.86
14,		4.07	3.45	2.85
15,		4.17	3.32	2.82

DAILY MEAN GAGE HEIGHTS OF LEHIGH RIVER AT TANNERY, CARBON COUNTY, PA.—Continued.

1914.	JUNE.	JULY.	AUG.	SEPT.
DAY.	G H	G H	G H	G H
16,	.....	3.99	†3.28	2.76
17,	.....	3.82	3.24	2.78
18,	.....	3.64	3.16	2.73
19,	.....	†3.50	3.21	2.70
20,	.....	3.37	3.55	†2.76
21,	.....	3.27	3.34	2.83
22,	.....	3.27	3.26	2.94
23,	.....	3.16	†3.24	2.94
24,	3.07	3.45	3.22	2.88
25,	3.11	3.55	3.12	2.82
26,	3.01	‡3.97	3.06	2.85
27,	3.00	3.80	2.96	†2.86
28,	‡3.00	4.16	3.06	2.86
29,	3.42	†4.03	3.07	2.88
30,	3.26	†3.89	†3.33	2.86
31,	.....	†3.75	3.59	.....

†Interpolated. ‡Estimated.

DELAWARE BASIN—STATION NO. 13.

LEHIGH RIVER AT BETHLEHEM, PA.

DESCRIPTION OF STATION.

LOCATION—At New Street Bridge, Bethlehem—9 span, steel, through-truss, highway bridge with 3 spans over normal channel.

RECORDS AVAILABLE—Discharge complete from September 22, 1902, to February 13, 1905, and April 26, 1909, to September 30, 1914.

DRAINAGE AREA—1,235 square miles.

GAGE—A standard chain gage is fastened to the downstream hand-rail in first span from left bank of normal channel. The length of chain from the bottom of the weight to the marker is 42.87 feet. The elevation of zero is 210.64 feet above sea level. Bench Mark No. 1 is shelf in fourth course from bottom on right hand downstream corner, third pier from left bank, elevation 223.55 feet above sea level, or 12.91 feet above gage datum. Bench Mark No. 2 is B. M. No. 72 of L. V. R. R. and is an iron pin set in south pier of New Street bridge, elevation 232.87 feet above sea level, or 22.23 feet above gage datum. Bench Mark No. 3 is cross cut on shelf in stone on fourth pier from north side, fifteenth course down from top of pier, downstream face, 2 feet

in from left or north downstream corner, elevation 228.06 feet above sea level, or 17.42 feet above gage datum. The gage is read twice daily by John E. Santee.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is point on handrail over center of pier between third and fourth trusses from left bank.

CHANNEL—The channel is straight for ½ mile below and for several hundred feet above the station. The right bank is high and does not overflow. The left bank is low and overflows at high stages. The bed is composed of sand and gravel. There is good velocity at all stages.

REMARKS—The Lehigh Canal follows the left bank and passes over Monocacy Creek and under the left span of the bridge. Monocacy Creek passes under canal on left bank and under bridge, entering river a short distance below. The discharge of the canal is measured at the Main St. Bridge, ½ mile above.

DISCHARGE MEASUREMENTS OF LEHIGH RIVER AT BETHLEHEM, NORTHAMPTON COUNTY, PA.

(Drainage area 1,235 square miles).

No.	Date.	Hydrographer.	Width.	Area of section	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914.		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
45	Jan. 9,	Boehringer & Shade,	292	1032	1.75	2.97	1812	0.6 method.
46	June 23,	Hosmer, ...	278	751	0.93	2.04	697	0.6 method. 102 sec. ft. in canal.
47	Aug. 17,	Bowen & Brady,. ..	280	857	1.03	2.22	882	0.6 method. 84 sec. ft. in canal..

DISCHARGE TABLE FOR LEHIGH RIVER AT BETHLEHEM, NORTHAMPTON COUNTY, FROM JAN. 1, 1912.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1.50	255	.70	2920	.90	7880	.10	13750	.30	20450
.60	335	.80	3100	6.00	8130	.20	14080	.40	20770
.70	400	.90	3280	.10	8380	.30	14370	.50	21090
.80	480	4.00	3470	.20	8640	.40	14660	.60	21410
.90	565	.10	3670	.30	8900	.50	14950	.70	21740
2.00	655	.20	3870	.40	9160	.60	15240	.80	22070
.10	750	.30	4070	.50	9420	.70	15530	.90	22400
.20	850	.40	4280	.60	9680	.80	15820	11.00	22730
.30	950	.50	4500	.70	9940	.90	16120	.10	23070
.40	1060	.60	4720	.80	10200	9.00	16420	.20	23410
.50	1170	.70	4940	.90	10470	.10	16720	.30	23750
.60	1280	.80	5170	7.00	10740	.20	17020	.40	24090
.70	1400	.90	5400	.10	11010	.30	17320	.50	24430
.80	1530	5.00	5640	.20	11280	.40	17630	.60	24770
.90	1670	.10	5880	.30	11550	.50	17940	.70	25110
3.00	1810	.20	6130	.40	11820	.60	18250	.80	25450
.10	1950	.30	6380	.50	12100	.70	18560	.90	25790
.20	2100	.40	6630	.60	12380	.80	18870	12.00	26130
.30	2260	.50	6880	.70	12660	.90	19180		
.40	2420	.60	7130	.80	12940	10.00	19490		
.50	2580	.70	7380	.90	13220	.10	19810		
.60	2750	.80	7630	8.00	13500	.20	20130		

Note—This table is only applicable subsequent to Jan. 1, 1912, and is based on 5 discharge measurements made during 1911 and 1913, together with the 1902 to 1905 curve.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF LEHIGH RIVER AT BETHLEHEM, NORTHAMPTON COUNTY, PA.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	3.04	1870	6.30	8900	2.80	1530	5.58	7080	3.85	3240	2.53	1250	2.19	885	2.65	1280	2.10	795
2,	2.65	1340	4.69	4920	2.66	1350	4.96	5540	3.64	2860	2.40	1100	2.32	1020	2.47	1180	2.01	710
3,	2.75	1460	4.42	4320	2.61	1290	4.74	5030	3.59	2780	2.29	985	2.58	1300	2.51	1230	1.94	646
4,	3.18	2070	4.16	3790	2.86	1610	4.51	4520	3.47	2580	2.27	965	2.35	1050	2.42	1130	1.92	628
5,	3.43	2470	3.99	3450	3.16	2040	4.26	3990	3.67	2910	2.64	1370	2.26	955	2.30	995	1.89	601
6,	3.20	2240	3.90	3280	3.25	2180	4.09	3650	4.28	4080	2.53	1250	2.21	905	2.31	1010	1.84	559
7,	3.03	1850	3.88	3240	2.88	1640	3.96	3390	3.78	3110	2.40	1100	2.47	1180	2.24	985	1.83	550
8,	2.97	1770	3.64	2820	2.76	1480	3.95	3380	3.62	2830	2.44	1150	3.05	1920	2.35	1050	1.86	576
9,	2.96	1750	3.16	2040	2.76	1480	4.98	5590	3.57	2740	2.61	1340	2.89	1700	2.32	1020	1.86	576
10,	2.89	1660	3.16	2040	2.67	1360	4.45	4390	3.63	2850	2.40	1100	2.95	1780	2.34	1040	1.88	550
11,	2.79	1520	3.12	1980	2.60	1280	4.26	3990	3.51	2640	2.23	925	3.43	2510	2.57	1290	1.80	525
12,	2.63	1320	2.79	1520	2.53	1200	4.15	3820	3.79	3130	2.12	815	3.39	2450	2.96	1800	1.76	493
13,	2.35	1000	2.80	1530	2.65	1340	4.04	3600	4.38	4280	2.05	748	3.03	1900	2.73	1480	1.60	370
14,	2.45	1120	2.55	1220	2.82	1560	3.79	3130	4.24	4000	2.01	710	2.96	1800	2.50	1220	1.77	501
15,	3.53	1200	3.15	2020	3.42	2450	3.76	3070	4.01	3600	2.19	885	3.19	2130	2.33	1030	1.69	437
16,	2.66	1350	3.00	1810	4.14	3750	4.23	3980	3.87	3270	2.08	728	3.03	1900	2.22	915	1.66	415
17,	2.76	1480	2.99	1800	4.62	4760	4.03	3580	3.72	3000	1.96	664	2.99	1840	2.22	915	1.66	415
18,	2.52	1190	2.88	1640	4.94	5500	3.73	3020	3.55	2710	2.01	710	2.84	1630	2.16	855	1.66	415
19,	2.49	1160	2.97	1779	4.15	3770	3.68	2930	3.39	2450	1.98	682	2.60	1280	2.13	825	1.62	385
20,	2.56	1240	2.87	1630	3.71	2940	3.77	3090	3.24	2210	1.96	682	2.53	1250	2.06	757	1.49	293
21,	2.96	1740	2.70	1400	3.37	2370	4.49	4520	3.11	2010	1.91	619	2.43	1140	2.10	795	1.68	430
22,	2.82	1560	2.57	1250	3.41	2440	4.32	4160	3.03	1900	2.06	757	2.37	1070	2.32	1010	1.71	453
23,	2.70	1400	2.67	1360	3.43	2470	4.14	3800	2.93	1760	2.09	786	2.30	995	2.20	895	1.73	469
24,	3.06	1890	2.60	1280	3.38	2390	3.93	3360	2.83	1620	2.16	855	2.27	965	2.17	865	1.70	445
25,	4.39	4260	2.53	1200	3.35	2340	3.86	3250	2.80	1580	2.06	757	2.40	1100	2.06	757	1.71	453
26,	3.35	2340	2.49	1160	3.34	3170	4.50	4540	2.72	1470	2.02	719	2.74	1500	2.03	728	1.73	469
27,	3.01	1820	2.57	1250	5.04	5740	5.15	6050	2.67	1410	1.90	610	2.77	1540	1.97	673	1.66	415
28,	2.99	1800	2.78	1500	6.68	9890	4.78	5170	2.94	1770	1.91	619	2.85	1640	1.94	646	1.64	400
29,	3.08	1920	.....	.....	†6.76	10100	4.46	4460	2.81	1590	2.15	845	3.35	2380	1.99	691	1.62	385
30,	3.27	2210	.....	.....	5.84	7730	4.14	3800	2.57	1290	2.42	1130	2.99	1840	1.94	646	1.63	392
31,	*5.28	6330	.....	.....	5.35	6500	.....	.....	2.50	1220	.....	.....	2.80	1580	1.94	646	.....	.....

*Maximum 6.90 at 5 p m.; 10500 sec. ft. †Maximum 7.04 at 7 a. m.; 10600 sec. ft. April 12 to Sept. 30, 45 sec. ft. added to daily discharge for canal.

ESTIMATED MONTHLY DISCHARGE OF LEHIGH RIVER AT BETHLEHEM, NORTHAMPTON COUNTY.

(Drainage area 1,235 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	10500	1000	1880	1.522	1.754
February,	8900	1160	2260	1.911	1.990
March,	10800	1200	3220	2.607	3.006
April,	7080	2930	4130	3.344	3.731
May,	4280	1220	2540	2.057	2.371
June,	1370	610	895	0.725	0.808
July,	2510	835	1520	1.231	1.419
August,	1800	646	981	0.794	0.915
September,	795	289	492	0.398	0.444

DELAWARE BASIN—STATION NO. 14.

DELAWARE RIVER AT RIEGELSVILLE, N. J.

DESCRIPTION OF STATION.

LOCATION—On three span, steel, suspension highway bridge, between Riegelsville, Pa., and Riegelsville, N. J.

RECORDS AVAILABLE—Discharge complete from July 3, 1906, to September 30, 1914.

DRAINAGE AREA—6,430 square miles.

GAGE—On September 10, 1914 an inclined staff gage was installed. The lower section is inclined, located on left bank under upstream edge of bridge, graduated by half tenths from 1.35 to 7.75 feet. The second section is attached to face of left abutment under bridge and reads from 7.5 to 19.4 feet. It is not vertical but is graduated to read vertical feet by tenths. The third section is nailed to a tree near upstream side of abutment and is graduated by tenths from 19.2 to 30.6 feet. This gage is set to chain gage datum. Also a standard chain gage is attached to the upstream handrail on the middle span of the bridge, 20 feet from east pier. The elevation of zero is arbitrary. The length of chain from the bottom of the weight to the marker is 43.56 feet. Bench Mark No. 1 is on top of steel part of downstream cable anchorage on N. J. side, elevation 40.765 feet above gage datum. Bench Mark No. 2 is southeast corner of porch under toll-keeper's house,

outside of post, elevation 39.365 feet above gage datum. Bench Mark No. 3 is spike in bench 6 inches above ground on shore side of silver maple. Tree is one nearest the bridge in a group about 200 feet upstream from left abutment, elevation 12.25 feet above gage datum. The gage is read twice daily by John H. Deemer.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is face of left abutment.

CHANNEL—The channel above and below the station is straight for one-half and one-fourth mile respectively. Both banks are high and not subject to overflow, although during extreme floods the right bank may overflow to a slight degree. The bed consists of gravel and boulders.

REMARKS—The Delaware Division Canal runs along the Pennsylvania shore about 200 feet from the river, and is measured at the highway bridge a short distance above the river bridge.

The following data have been furnished by the United States Geological Survey:

DISCHARGE MEASUREMENTS OF DELAWARE RIVER AT RIEGELSVILLE, N. J.

(Drainage area 6,430 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
20	Jan. 7,	Boehringer & Shade,	472	4376	1.86	4.56	8114	Surf. & 0.6 msmt.
21	June 22,	Hoomer, ...	452	3561	0.89	2.88	3166	0.6 msmt. 232 sec. ft. in canal.
22	Aug. 18,	Bowen & Brady, ...	417	3521	0.78	2.73	2745	0.2 & 0.8 msmt.

DISCHARGE TABLE FOR DELAWARE RIVER AT RIEGELSVILLE, N. J., FROM 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1.50	810	.70	8490	.90	21130	.10	38690	.30	60250
.60	930	.80	8830	8.00	21600	.20	39210	.40	60970
.70	1050	.90	9160	.10	22080	.30	39930	.50	61690
.80	1200	5.00	9500	.20	22560	.40	40560	.60	62410
.90	1350	.10	9840	.30	23050	.50	41190	.70	63130
2.00	1500	.20	10190	.40	23540	.60	41820	.80	63850
.10	1660	.30	10540	.50	24040	.70	42460	.90	64570
.20	1830	.40	10890	.60	24540	.80	43100	15.00	65300
.30	2010	.50	11250	.70	25050	.90	43760	.10	66030
.40	2200	.60	11610	.80	25560	12.00	44400	.20	66760
.50	2400	.70	11980	.90	26080	.10	45060	.30	67490
.60	2600	.80	12350	9.00	26600	.20	45720	.40	68220
.70	2810	.90	12720	.10	27130	.30	46380	.50	68950
.80	3030	6.00	13100	.20	27660	.40	47050	.60	69680
.90	3260	.10	13480	.30	28200	.50	47720	.70	70410
3.00	3500	.20	13860	.40	28750	.60	48390	.80	71140
.10	3750	.30	14250	.50	29300	.70	49060	.90	71870
.20	4000	.40	14640	.60	29860	.80	49740	16.00	72600
.30	4260	.50	15040	.70	30420	.90	50420	.10	73340
.40	4530	.60	15440	.80	30990	13.00	51100	.20	74080
.50	4800	.70	15850	.90	31560	.10	51790	.30	74830
.60	5080	.80	16260	10.00	32130	.20	52480	.40	75580
.70	5360	.90	16680	.10	32710	.30	53170	.50	76300
.80	5650	7.00	17100	.20	33290	.40	53870	.60	77050
.90	5950	.10	17530	.30	33880	.50	54570	.70	77800
4.00	6250	.20	17960	.40	34470	.60	55270	.80	78550
.10	6560	.30	18400	.50	35060	.70	55970	.90	79300
.20	6870	.40	18840	.60	35660	.80	56680	17.00	80050
.30	7190	.50	19290	.70	36260	.90	57390	18.00	87650
.40	7510	.60	19740	.80	36860	14.00	58100	19.00	95250
.50	7830	.70	20200	.90	37470	.10	58810	20.00	103150
.60	8160	.80	20660	11.00	38080	.20	59530		

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF DELAWARE RIVER AT RIEGELSVILLE, N. J.

1918.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.		OCT.		NOV.		DEC.	
DAY.	G H	Dis	G H	Dis.	G H	Dis	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1, ...	8.00	21600	5.60	11600	6.00	13100	10.50	35100	8.80	25600	5.80	12400	2.65	2700	2.30	2010	2.35	2100	2.60	2600	4.30	7190	4.90	9160
2, ...	7.70	20200	5.50	11200	7.90	21100	9.80	31000	7.90	21100	5.30	10500	2.65	2700	4.30	7190	2.25	1920	4.10	6560	4.10	6560	4.90	9160
3, ...	7.70	20200	5.20	10200	6.10	13500	8.60	24500	7.20	18000	5.00	9500	2.55	2500	3.10	3750	2.15	1740	3.90	5950	4.00	6250	4.60	8160
4, ...	10.50	35100	5.00	9500	5.60	11600	8.10	22100	6.60	15400	4.70	8490	2.50	2400	2.85	3140	2.10	1660	3.70	5380	3.80	5860	4.50	7830
5, ...	11.80	43100	4.40	7510	5.40	10900	7.80	20700	6.10	13500	4.50	7830	2.45	2300	2.55	2500	2.35	2100	3.40	4530	3.70	5360	4.40	7510
6, ...	9.80	31000	4.50	7830	5.20	10200	7.70	20200	5.90	12700	5.20	10200	2.50	2400	2.40	2200	2.15	1740	3.20	4000	3.60	5080	4.30	7190
7, ...	8.80	25600	4.00	6250	4.80	8820	7.40	18800	5.60	11600	4.60	8160	2.60	2600	2.85	3140	2.10	1660	3.00	3600	3.50	4800	4.40	7510
8, ...	9.40	28800	3.80	5650	4.10	6560	6.80	16300	5.20	10200	4.30	7190	2.55	2500	2.65	2700	2.80	3030	2.95	3880	3.40	4530	5.20	10200
9, ...	16.00	72600	4.00	6250	4.20	6870	6.40	14600	5.00	9500	4.30	7190	2.45	2300	2.55	2500	2.80	3010	2.90	3260	4.60	8160	6.00	13100
10, ...	12.70	49100	4.20	6870	4.30	7190	6.10	13500	4.70	8490	4.20	6870	3.30	4260	2.50	2400	2.20	1830	2.85	3140	11.20	39300	5.90	12700
11, ...	10.50	35100	4.00	6250	5.20	10200	6.00	13100	4.60	8160	3.90	5950	2.65	2700	2.40	2200	2.10	1660	2.80	3030	12.80	49700	5.40	10900
12, ...	9.80	31000	4.00	6250	5.60	11600	9.00	26600	4.50	7830	3.70	5360	2.45	2300	2.35	2100	2.15	1740	3.10	3750	9.50	29800	5.10	9840
13, ...	10.40	34600	3.70	5360	5.60	11600	10.30	33900	4.40	7510	3.60	5080	2.50	2400	2.25	1920	2.15	1740	3.30	4260	7.90	21100	4.90	9160
14, ...	9.40	28800	3.60	5080	7.10	17500	9.60	29900	4.20	6870	3.50	4800	2.30	3030	2.25	1920	2.00	1500	3.10	3750	6.90	16700	4.80	8820
15, ...	7.90	21100	3.80	5650	12.10	45100	9.20	27700	4.10	6560	3.40	4530	2.55	2500	2.20	1830	2.05	1580	3.00	3500	6.50	15000	4.80	8820
16, ...	7.60	19700	3.90	5950	12.40	47000	9.10	27100	4.00	6250	3.40	4530	2.50	2400	2.20	1830	2.05	1580	2.90	3260	6.30	14200	4.70	8490
17, ...	7.50	19300	4.00	6250	10.90	37500	8.20	22600	4.00	6250	3.20	4000	2.40	2200	2.25	1920	1.90	1350	2.80	3030	6.40	14600	4.60	8160
18, ...	7.80	20700	3.80	5650	9.30	28200	7.60	19700	3.90	5950	3.10	3750	2.45	2300	2.35	2100	2.00	1500	2.80	3030	6.00	13100	4.50	7830
19, ...	8.60	24500	3.80	5650	8.20	22600	7.10	17500	3.90	5950	3.00	3500	2.45	2300	2.25	1920	2.00	1500	2.65	2700	5.80	12400	4.30	7190
20, ...	8.50	24000	3.80	5650	8.30	23000	6.70	15800	3.80	5650	3.00	3500	2.35	2100	2.20	1830	2.10	1660	3.10	3750	5.70	12000	4.20	6870
21, ...	7.90	21100	3.90	5950	9.30	28200	6.20	13900	3.70	5360	3.30	4260	2.25	1920	2.25	1920	2.20	1830	4.00	6250	5.60	11600	4.00	6250
22, ...	7.80	20700	4.00	6250	9.30	28200	5.90	12700	3.70	5360	3.30	4260	2.25	1920	2.15	1740	3.80	5650	4.60	8160	5.50	11200	4.10	6560
23, ...	7.70	20200	4.90	9160	8.80	25600	5.70	12000	3.80	5650	3.20	4000	2.20	1830	2.25	1920	3.60	5080	5.00	9600	5.40	10900	4.20	6870
24, ...	7.30	18400	4.50	7830	8.00	21600	5.60	11600	5.40	10900	3.10	3750	2.10	1660	2.25	1920	3.70	5360	4.40	7510	5.10	9840	5.30	10500
25, ...	7.30	18400	4.50	7830	7.90	21100	5.40	10800	6.00	13100	3.00	3500	2.60	2600	2.20	1830	3.60	5080	5.20	10200	4.90	9160	5.20	10200
26, ...	7.10	17500	4.60	8160	8.30	23000	5.20	10200	5.70	12000	2.90	3260	2.50	2400	2.20	1830	3.20	4000	6.40	14600	4.80	8820	6.40	14600
27, ...	6.70	15800	4.40	7510	13.30	53200	5.20	10200	5.10	9840	3.00	3500	2.30	2010	2.15	1740	2.90	3260	6.70	15800	4.60	8160	6.20	13900
28, ...	6.50	15000	6.20	13900	24.40	139000	10.30	33900	5.00	9500	3.10	3750	2.40	2200	2.05	1580	2.60	2600	6.10	13500	4.60	8160	5.50	11200
29, ...	6.10	13500	.....	.....	18.80	93300	11.00	38100	5.30	10500	3.00	3500	2.40	2200	2.15	1740	2.60	2600	5.40	10900	4.60	8160	5.00	9500
30, ...	5.70	12000	.....	.....	13.80	56700	10.20	33300	6.80	16300	2.95	3380	2.40	2200	2.10	1660	2.50	2400	4.90	9160	4.70	8490	4.60	8160
31, ...	5.60	11600	.....	.....	11.60	41900	.....	.....	6.40	14600	.....	.....	2.35	2100	2.20	1830	.....	.....	4.60	8160	.....	.....	4.50	7830

Note.—April 15 to Dec. 15, 250 sec. ft. added to canal before computing run-off values.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF DELAWARE RIVER AT RIEGELSVILLE, N. J.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	4.50	7830	9.70	30400	4.10	6560	12.40	53900	8.10	22100	3.80	5650	3.10	3770	3.70	4700	2.80	3030
2,	4.20	6870	9.80	31000	3.60	5080	12.40	53900	7.60	19700	3.70	5360	3.60	5080	3.20	4000	2.95	3380
3,	4.30	7190	8.60	24500	3.60	5080	12.80	56700	6.90	16400	3.80	5650	3.80	5650	3.70	4260	2.95	3380
4,	4.60	8160	7.70	20200	3.90	5950	12.50	47700	6.70	15600	3.60	5080	3.60	5080	3.10	3750	2.85	3140
5,	4.90	9160	7.40	18800	4.20	6870	10.70	36300	6.30	14200	3.90	5950	3.40	4530	2.95	3380	2.75	2920
6,	4.80	8820	7.20	18000	4.50	7830	9.40	28900	7.80	20700	4.30	7190	3.30	4260	2.90	3360	2.80	3030
7,	4.50	7830	6.80	16300	4.20	6870	8.80	25600	9.10	27100	4.10	6560	3.50	4800	2.80	3030	2.80	3030
8,	4.50	7830	6.40	14600	4.00	6250	8.40	23100	8.00	21600	4.00	6250	4.20	6870	2.80	3030	2.65	2700
9,	4.40	7510	5.40	10900	4.10	6560	11.50	44200	7.30	18400	3.90	5950	3.90	5950	2.90	3260	2.55	2500
10,	4.30	7190	5.10	9840	3.90	5950	15.50	69000	7.20	18000	4.00	6250	3.80	5650	2.75	2920	2.45	2300
11,	4.30	7190	5.10	9840	3.80	5650	11.80	48100	6.80	16300	4.00	6250	4.20	6870	2.80	3030	2.40	2200
12,	3.90	5950	4.90	9250	3.70	5360	10.30	38900	6.90	16700	3.80	5650	4.40	7510	3.10	3750	2.40	2200
13,	3.10	3750	3.70	5360	3.80	5650	9.60	29900	8.10	21100	3.50	4800	4.60	8160	3.00	3500	2.30	2010
14,	2.90	3260	4.00	6250	3.90	5950	9.00	26600	10.00	32100	3.30	4260	4.40	7510	3.00	3500	2.35	2100
15,	3.30	4260	3.70	5360	4.30	7190	8.20	22600	8.80	25600	3.20	4000	4.40	7510	3.00	3500	2.25	1920
16,	3.40	4530	4.00	6250	5.40	10900	8.30	23000	8.20	22600	3.10	3750	4.20	6870	2.90	3260	2.20	1830
17,	3.70	5360	4.10	6560	6.00	13100	8.60	24500	7.70	19300	3.00	3500	4.00	6250	2.85	3140	2.25	1920
18,	3.50	4800	4.20	6870	7.30	19300	8.40	23500	6.90	16700	2.90	3260	3.80	5650	2.60	2600	2.25	1920
19,	3.60	5080	4.30	7190	6.40	14600	8.00	21600	6.40	14600	2.90	3260	4.60	8160	2.60	2600	2.15	1740
20,	3.70	5360	4.20	6870	6.60	15400	7.80	20700	6.00	13100	3.40	4530	3.80	5650	2.60	2600	2.15	1740
21,	3.40	4530	4.20	6870	6.30	14200	9.90	31600	5.80	12400	2.90	3260	3.70	5360	2.95	3380	2.10	1660
22,	3.90	5950	4.10	6560	6.20	13900	12.50	47700	5.40	10900	3.00	3500	3.50	4800	3.50	4800	2.10	1660
23,	3.80	5650	4.10	6560	5.70	12000	10.40	34500	5.00	9600	2.95	3380	3.30	4260	4.40	7510	2.05	1580
24,	4.30	7190	3.80	5650	5.50	11200	8.90	26100	4.80	8820	3.40	4530	3.20	4000	4.10	6560	2.00	1500
25,	6.50	15000	3.70	5360	5.60	11600	7.90	21100	4.60	8160	3.40	4530	3.30	4260	3.60	5080	2.00	1500
26,	4.60	8160	3.80	5650	6.30	14200	8.50	24000	4.50	7830	3.40	4530	3.60	5080	3.20	4000	2.10	1660
27,	4.50	7830	3.90	5950	8.30	23000	11.10	38700	4.40	7510	3.20	4000	3.60	5080	3.10	3750	2.00	1500
28,	4.40	7510	4.00	6250	18.30	90000	10.40	34500	4.70	8490	3.10	3750	3.60	5080	2.95	3380	2.00	1500
29,	4.60	8160	.....	.....	23.40	130000	9.10	27100	4.50	7830	3.30	4260	4.10	6560	2.90	3260	2.00	1500
30,	4.70	8490	.....	.....	18.40	90700	8.40	23100	4.70	6870	3.40	4530	3.80	5650	2.85	3140	2.00	1500
31,	4.60	8160	.....	.....	14.90	64600	.....	.....	4.00	6250	.....	.....	3.70	5360	2.80	3030	.....	.....

Note.—No water in canal Dec. 16, 1913—Mar. 22, 1914. Water turned in canal Mar. 23. Canal bank failed during high water following. Water turned in again on April 5. Add 250 sec ft. for canal Mar. 23-28 and April 5-Sept. 30.

ESTIMATED MONTHLY DISCHARGE OF DELAWARE RIVER AT RIEGELSVILLE, N. J.

(Drainage area 6,430 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
a1913.					
January,	72600	11600	25500	3.970	4.580
February,	13900	5080	7400	1.150	1.200
March,	139000	6560	28900	4.490	5.180
April,	38100	10200	21200	3.300	3.720
May,	25600	5380	10500	1.630	1.940
June,	12400	3260	5680	.922	1.030
July,	4260	1660	2380	.409	.470
August,	7190	1580	2280	.393	.450
September,	5650	1350	2450	.420	.470
October,	15800	2600	6130	.992	1.140
November,	49700	4530	12800	2.040	2.280
December,	14600	6250	9170	1.440	1.660
The year,	139000	1350	11200	1.770	24.120
b1914.					
January,	15000	3260	6920	1.080	1.240
February,	31000	5360	11170	1.730	1.800
March,	130000	5080	20700	3.220	3.710
April,	69000	20700	33800	5.300	5.910
May,	32100	6250	15700	2.490	2.870
June,	7190	3260	4660	0.779	0.870
July,	8160	3750	5720	0.928	1.070
August,	7510	2600	3710	0.616	0.710
September,	3380	1500	2140	0.372	0.410

a—In order to determine the discharge per square mile and the run-off depth in inches, 250 second-feet were added April 15 to December 15, 1913, before computing the discharge per square mile. Hence the first three columns indicate the actual quantity of water available in the river, and the two remaining columns represent the actual run-off from the drainage area above Riegelsville including the discharge of the canal.

b—In order to determine the discharge per square mile and the run-off depth in inches, 250 second feet were added March 23 to 28, and April 5 to September 30, before computing the discharge per square mile. Hence the first three columns indicate the actual quantity of water available in the river, and the two remaining columns represent the actual run-off from the drainage area above Riegelsville, including the discharge of the canal.

SCHUYLKILL RIVER.

DESCRIPTION OF BASIN.

The Schuylkill River, the largest tributary of the Delaware River in Pennsylvania, drains approximately 1,920 square miles in the southeastern portion of the State. Rising between Broad and Sharp mountains in Schuylkill County, it follows a general southeasterly course to its mouth immediately below Philadelphia, its length from source to mouth being approximately 128 miles, of which the last eight are in tidewater.

The sources of the river are in the heart of the anthracite coal field of Pennsylvania where coal mining towns are numerous and the country has long since been largely deforested on account of the need of the timber in the numerous coal mines. After the river breaks through the Blue Mountains on the border between Berks and Schuylkill counties, forming the Schuylkill Water Gap, it enters a rich, rolling agricultural country which continues to the mouth, with several cities and many towns on its banks and scattered through the valley.

From near the source to its mouth the river has a fall of about 800 feet or an average slope of 6.4 feet per mile for 125 miles. Most of this fall is above Reading with 9.6 feet per mile from Port Carbon to Reading, and then to its mouth 2.6 feet per mile. The Schuylkill Navigation Company operates a canal and slackwater system of navigation from the anthracite region to tidewater, consisting of 31 dams 4 to 24 feet high, and 71 locks, with short sections of canal connecting the pools.

The chief tributaries are West Branch, Little Schuylkill River, Maiden, Tulpehocken, Manatawney, French, Pickering, Perkiomen and Wissahickon creeks.

The population occupying the Schuylkill River basin exceeds half a million exclusive of the city of Philadelphia, while fully one-third of the population of that municipality live on territory which naturally drains into the Schuylkill River.

The drainage of many important mines and extensive waste dumps, impregnated with sulphuric acid, discharges into the upper tributaries in such volume as to destroy fish and other living organisms. From the coal mining operations much mine refuse has been carried into the river by freshets and enormous amounts of culm are discharged into the tributaries and from these into the main stream where considerable river coal is obtained by dredging.

Except for occasional divergence across bends, both shore lines of the river are occupied by railroads. These railroads cross each other and the river by numerous bridges, while the valleys of most of the tributaries are also occupied by branch railroad lines.

Owing to low water occurring at the season of the year when canal traffic was at its maximum, it became necessary to supplement stream flow near the headwaters, and large storage reservoirs were constructed to regulate the supply to the canal, some of which are still maintained.

Numerous public and industrial water supplies are drawn from the Schuylkill River and its tributaries. Where the main river has been utilized for such supply, pumping has been necessary, but gravity

Gaging Station on Schuylkill River at Schuylkill Haven.

supplies are secured or water storage obtained on a number of tributaries; the city of Philadelphia obtains part of its supply from this river.

While there is no large quantity of heavy timber in the basin, there is a liberal amount of woodland cover.

The principal cities and boroughs are Philadelphia, Norristown, Phoenixville, Pottstown, Birdsboro, Reading, Pottsville and Tamaqua, together with numerous smaller boroughs and other communities.

The manufacturing industries of the communities are important and varied, with iron and steel products predominating. Along the canal considerable water power has been developed. With the central portion of the basin traversed by a limestone section, many quarries are in operation producing flux for the blast furnaces and lime for building and agricultural purposes; marble is quarried in the territory tributary to Conshohocken.

The average yearly rainfall over this watershed, which is long and narrow, varies considerably, ranging between 40 and 55 inches, with the upper portion of the watershed receiving the heaviest precipitation in the State.

The discharge has been measured since May 7, 1914, at Schuylkill Haven, since May 6, 1914, at Reading, since June 8, 1914, at Conshohocken, and was measured from January 1, 1903, to December 31, 1912, at Fairmount Pool, Philadelphia. It has also been measured since May 7, 1914, at Molino, on the Little Schuylkill River, and, since June 11, 1914, on Perkiomen Creek at Graters Ford. Records are also available on Perkiomen Creek at Spring Mount from August 20, 1884, to December 31, 1912, and on Wissahickon Creek near Philadelphia for periods between May, 1897, to July, 1906.

DELAWARE BASIN—STATION NO. 15.

SCHUYLKILL RIVER AT SCHUYLKILL HAVEN, PA.

DESCRIPTION OF STATION.

LOCATION—On five arch stone masonry P. & R. Railroad bridge, at Schuylkill Haven, Schuylkill County.

RECORDS AVAILABLE—Discharge measurements and gage heights from May 7, 1914, to September 30, 1914.

DRAINAGE AREA—127 square miles.

GAGE—A standard chain gage is attached to the downstream hand-rail, near the right bank. The length of chain from the bottom of the weight to the marker is 24.01 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is on downstream right corner of right abutment, knob cut on top of projecting stone, 7th course below coping, elevation 11.35 feet above gage datum. The gage is read twice daily by Edward Zimmerman.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is extreme right end of east iron guard fence or face of stone post.

CHANNEL—The channel above the station curves slightly to the right. The channel is straight below the station. Both banks are high and not subject to overflow. The bed is culm covered and not permanent.

DISCHARGE MEASUREMENTS OF SCHUYLKILL RIVER AT SCHUYLKILL HAVEN, SCHUYLKILL COUNTY, PA.

(Drainage area 127 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
1	May 7,	Hosmer & Bowen, ...	127	163	2.15	2.22	350	0.6 msmt.
2	May 12,	Record & Wilson, ...	130	181	2.40	2.36	433	Surf. and 0.6 msmt.
3	May 14,	Taylor, ...	129	229	2.13	2.48	490	Surf. and 0.6 msmt.
4	May 14,	Taylor, ...	129	221	2.18	2.46	482	Surf. msmt.
5	June 26,	Hosmer, ...	61	50	1.64	1.05	82	Surf. and 0.6 msmt.
6	Sept. 9,	Wilson & Taylor, ...	43	41	1.68	0.88	69	0.6 msmt.

DAILY MEAN GAGE HEIGHTS OF SCHUYLKILL RIVER AT SCHUYLKILL HAVEN, SCHUYLKILL COUNTY, PA.

1914.	MAY.	JUNE.	JULY.	AUG.	SEPT.
DAY.	G. H.	G. H.	G. H.	G. H.	G. H.
1,	.....	1.39	0.96	1.06	0.94
2,	.....	1.36	1.16	1.00	0.92
3,	.....	1.31	1.06	1.04	0.95
4,	.....	1.55	0.96	0.95	0.92
5,	.....	1.50	0.95	0.89	0.89
6,	.....	1.32	0.95	0.90	0.91
7,	2.22	1.24	1.30	0.88	0.88
8,	2.12	1.40	1.20	0.90	0.95
9,	2.42	1.33	0.98	0.92	0.84
10,	2.24	1.35	1.08	0.90	0.77

DAILY MEAN GAGE HEIGHTS OF SCHUYLKILL RIVER AT SCHUYLKILL HAVEN, SCHUYLKILL COUNTY, PA.—Continued.

1914. DAY.	MAY. G. H.	JUNE. G. H.	JULY. G. H.	AUG. G. H.	SEPT. G. H.
11.	2.18	1.33	1.34	1.09	0.84
12.	2.33	1.33	1.11	0.92	0.86
13.	2.55	1.29	1.05	0.94	0.86
14.	2.48	1.31	1.69	0.84	0.77
15.	2.43	1.36	2.06	0.79	0.77
16.	2.33	1.22	1.82	0.78	0.76
17.	2.23	1.20	1.90	0.80	0.75
18.	2.14	1.20	1.69	0.78	0.72
19.	2.02	1.19	1.56	0.79	0.74
20.	1.96	1.21	1.40	1.24	0.78
21.	1.85	1.17	1.29	1.78	0.79
22.	1.78	1.22	1.21	1.30	0.79
23.	1.76	1.11	1.19	1.12	0.78
24.	1.67	1.12	1.20	1.02	0.90
25.	1.55	1.09	1.13	0.97	0.90
26.	1.52	1.06	1.09	0.96	0.78
27.	1.56	1.11	1.09	0.96	0.78
28.	1.65	1.08	1.81	1.04	0.78
29.	1.48	1.42	1.33	1.11	0.74
30.	1.51	1.12	1.22	1.07	0.70
31.	1.43	.....	1.17	1.00	.....

LITTLE SCHUYLKILL RIVER.

DESCRIPTION OF BASIN.

Little Schuylkill River, one of the larger tributaries of the Schuylkill River, joins the main stream at Port Clinton, Schuylkill County, and drains an approximate area of 142 square miles in Schuylkill and Carbon counties. This stream rises on the south side of Spring Mountain and flows in a general southerly direction to its mouth, a total distance of approximately 30 miles. The elevation of its source is 1,820 feet above sea level, and at its mouth it is 410 feet, having an average fall of 47 feet per mile, while the fall from the source to Tamaqua, a distance of approximately 9 miles, is at the rate of 116 feet per mile. A short distance above Tamaqua the stream passes through a gorge-like valley where, in a distance of ¾ mile, the fall is approximately 100 feet. The stream drains a rough, mountainous country, the steep sides of which are covered with timber, while in the valleys and on the plateaus there is some farming. In the valleys of the tributaries lies one of the largest anthracite coal mining regions in Pennsylvania, and the stream is contaminated by coal waste throughout most of its course.

Its tributaries are small, the largest being Panther Creek and the only large towns in the watershed are Tamaqua, Lansford, Coaldale and Summit Hill, all of which are mining communities.

The mean annual precipitation over this watershed is between 50 and 55 inches, the largest in the state.

The discharge has been measured since May 7, 1914, at Molino, approximately 2½ miles above the mouth.

DELAWARE BASIN—STATION NO. 16.

LITTLE SCHUYLKILL RIVER AT MOLINO, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, through-truss, steel, highway bridge, at Molino, Schuylkill County.

RECORDS AVAILABLE—Discharge measurements and gage heights from May 7, 1914, to September 30, 1914.

DRAINAGE AREA—138 square miles.

GAGE—A standard chain gage is attached to the downstream handrail. The length of chain from the bottom of the weight to the marker is 18.88 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is on face of left abutment 4.5 feet below top and 1.6 feet from upstream corner, elevation 8.75 feet above gage datum. The gage is read twice daily by Frank A. Schickram.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is extreme right end of top handrail.

CHANNEL—The channel above and below the station is straight for 300 feet. The banks are low, but they do not overflow during high stages. The bed is composed of culm and is not permanent.

DISCHARGE MEASUREMENTS OF LITTLE SCHUYLKILL RIVER AT MOLINO, SCHUYLKILL COUNTY, PA.

(Drainage area 138 square miles).

No	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
1	May 7,	Hosmer & Bowen, ...	115	199	1.70	2.10	339	0.6 msmt.
2	May 12,	Reckord & Wilson, ..	116	200	1.78	2.20	355	0.6 msmt.
3	May 14,	Taylor, ...	116	216	1.38	2.30	297	Surf. msmt.
4	May 14,	Taylor, ...	116	216	1.34	2.32	290	Surf. msmt.
5	May 14,	Taylor, ...	116	214	1.35	2.33	289	Surf. msmt.
6	June 27,	Hosmer, ...	84	50	1.12	0.93	56	Surf. and 0.6 msmt.
7	Sept. 9,	Wilson & Taylor, ...	69	37	0.95	0.58	35	Surf. msmt.

DAILY MEAN GAGE HEIGHTS OF LITTLE SCHUYLKILL RIVER AT MOLINO, SCHUYLKILL COUNTY, PA.

1914. DAY.	MAY. G. H.	JUNE. G. H.	JULY. G. H.	AUG. G. H.	SEPT. G. H.
1.	.....	1.40	1.01	0.89	0.74
2.	.....	1.37	1.31	0.86	0.71
3.	.....	1.31	1.14	0.89	0.77
4.	.....	1.39	1.01	0.78	0.71
5.	.....	1.47	0.97	0.77	0.68
6.	.....	1.27	0.99	0.76	0.67
7.	.....	1.25	1.23	0.77	0.70
8.	2.04	1.21	1.24	0.80	0.66
9.	2.22	1.19	1.03	0.79	0.61
10.	2.09	1.19	1.01	0.75	0.54
11.	2.05	1.13	1.05	0.76	0.56
12.	2.20	1.14	1.08	0.96	0.62
13.	2.46	1.07	0.95	0.81	0.62
14.	2.33	1.10	0.99	0.76	0.60
15.	2.31	1.11	1.47	0.76	0.55
16.	2.23	1.05	1.25	0.73	0.56
17.	2.14	1.01	1.25	0.70	0.50
18.	2.03	0.99	1.17	0.70	0.50
19.	1.96	1.01	1.09	0.68	0.60
20.	1.91	1.07	1.02	1.22	0.59
21.	1.86	1.01	0.98	1.48	0.59
22.	1.81	1.03	0.95	1.12	0.57
23.	1.75	0.99	0.95	0.96	0.60
24.	1.70	0.99	0.91	0.88	0.62
25.	1.61	1.04	0.93	0.78	0.65
26.	1.59	0.97	0.96	0.77	0.62
27.	1.65	0.96	0.90	0.74	0.56
28.	1.66	1.05	1.07	0.75	0.59
29.	1.52	1.45	0.99	1.00	0.55
30.	1.51	1.15	0.89	0.92	0.48
31.	1.44	.....	0.92	0.86	.....

DELAWARE BASIN—STATION NO. 17.

SCHUYLKILL RIVER AT READING, PA.

DESCRIPTION OF STATION.

LOCATION—On Penn Street concrete highway bridge at Reading, Berks County.

RECORDS AVAILABLE—Discharge complete from May 6, 1914, to September 30, 1914.

DRAINAGE AREA—900 square miles.

GAGE—A standard chain gage is fastened to the downstream side of the bridge. The length of chain from the bottom of the weight to the marker is 49.24 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is P. R. R. B. M. and is a copper bolt set inside of square cut in top of door sill of first door from downstream

PERKIOMEN CREEK.

DESCRIPTION OF BASIN.

Perkiomen Creek, one of the largest tributaries of the Schuylkill River, drains an area of 362 square miles in Berks, Lehigh, Bucks and Montgomery counties. Rising in the eastern corner of Berks County at elevation 900 feet, the main stream flows in a general southerly direction for 36 miles to its mouth near Perkiomen Junction, Montgomery County, elevation 75 feet, having an average fall of 23 feet per mile. The basin is pear shaped with many large and small tributaries, most of which join the main stream in its upper half; the largest of the tributaries are Skippack Creek, Northeast Branch, West Swamp Creek, East Swamp Creek and Northwest Branch. The territory drained by this creek and its tributaries is a hilly agricultural region, and, although it contains no large communities, the basin is well populated.

The stream is subject to sudden freshets and, during heavy rains, large quantities of surface soil are eroded.

The mean annual precipitation over this watershed is from 40 to 50 inches.

The discharge was measured from 1884 to 1912 inclusive at Frederick, (Spring Mount) by the Philadelphia Bureau of Water, when it was discontinued. Since June 11, 1914, the discharge has been measured by the Water Supply Commission of Pennsylvania at Graters Ford, Montgomery County.

DELAWARE BASIN—STATION NO. 18.

PERKIOMEN CREEK AT GRATERS FORD, PA.

DESCRIPTION OF STATION.

LOCATION—On two span, pony truss bridge, at Graters Ford, Montgomery County.

RECORDS AVAILABLE—Discharge measurements and gage heights from June 11 to September 30, 1914.

DRAINAGE AREA—280 square miles.

Gaging Station on Perkiomen Creek at Graters Ford.

GAGE—A standard chain gage is fastened to the upstream handrail in the right span. The length of chain from the bottom of the weight to the marker is 28.81 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is natural shelf on stone in fourteenth course from top on face of right abutment; stone is fifteenth in from upstream end and seventh from downstream end, elevation 8.53 feet above gage datum. The gage is read twice daily by I. H. Smoyer.

DISCHARGE MEASUREMENTS—Taken from the downstream side of bridge. The initial point for soundings is centre of bridge pin, right end of downstream side.

CHANNEL—The channel above the station is straight for 2,000 feet. Below the station it is straight for 1,000 feet and then curves to the left. The right bank is high and not subject to overflow, while the left bank is medium and may overflow during extreme freshets. The bed is composed of rock and gravel.

DISCHARGE MEASUREMENTS OF PERKIOMEN CREEK AT GRATERS FORD, MONTGOMERY COUNTY, PA.

(Drainage area 280 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
1	June 11	Reckord & Taylor, ..	141	277	0.28	2.89	77	Surf. msmt.
2	Sept. 10	Wilson & Taylor, ...	141	269	0.14	2.84	37	Surf. msmt.

DAILY MEAN GAGE HEIGHTS OF PERKIOMEN CREEK AT GRATERS FORD, MONTGOMERY COUNTY, PA.

1914.	JUNE.	JULY.	AUG.	SEPT.
DAY.	G H	G H	G H	G H
1,	.....	2.98	3.13	3.48
2,	.....	3.22	3.11	3.23
3,	.....	3.23	3.13	3.30
4,	.....	3.12	3.21	3.24
5,	.....	3.08	3.19	3.18
6,	.....	3.12	3.15	3.30
7,	.....	3.38	3.16	3.17
8,	.....	3.50	3.11	3.11
9,	.....	3.28	3.19	2.96
10,	.....	3.16	3.05	2.89
11,	2.89	3.08	3.13	2.96
12,	2.90	3.08	3.39	2.94
13,	2.86	3.06	3.36	3.21
14,	2.98	3.06	3.27	2.96
15,	2.91	4.75	3.23	2.70
16,	2.90	3.70	3.31	2.48
17,	2.97	3.66	3.13	2.92
18,	2.90	3.38	3.13	2.68
19,	2.84	3.26	3.08	2.47
20,	2.96	3.17	3.07	2.82
21,	2.98	3.14	3.17	3.04
22,	2.98	3.03	3.08	2.76
23,	2.99	3.07	3.33	2.45
24,	3.13	3.02	3.25	2.16
25,	3.14	2.98	3.31	2.42
26,	3.02	3.08	3.22	2.64
27,	2.94	3.02	3.15	2.74
28,	3.00	3.43	3.23	2.68
29,	2.93	3.32	3.53	2.59
30,	2.97	3.14	3.60	2.63
31,	.....	3.10	3.51	.....

DELAWARE BASIN—STATION NO. 19.

SCHUYLKILL RIVER AT CONSHOHOCKEN, PA.

DESCRIPTION OF STATION.

LOCATION—On five span, steel, through-truss, highway bridge between East and West Conshohocken, known as Matsons Ford Bridge.

RECORDS AVAILABLE—Discharge measurements and gage heights from June 8 to September 30, 1914.

DRAINAGE AREA—1,795 square miles.

GAGE—A standard chain gage is fastened to the handrail on the downstream side of the bridge in the centre span. The length

Gaging Station on Schuylkill River at Conshohocken.

of chain from bottom of weight to marker is 34.99 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is natural shelf on face of stone in 5th course from bottom of right abutment, one foot upstream from downstream corner, elevation 12.40 feet above gage datum. The gage is read twice daily by O. R. Tomlinson.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is left end of handrail on downstream side of bridge.

CHANNEL—The channel above and below the station is straight for more than 1,000 feet and 400 feet respectively. The right bank is high and not subject to overflow, as is also the left. The bed is rocky with some vegetable matter.

DISCHARGE MEASUREMENTS OF SCHUYLKILL RIVER AT CONSHOHOCKEN, MONTGOMERY COUNTY, PA.

(Drainage area 1,795 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
1	June 11	Rockord & Taylor, ...	348	1084	0.91	3.06	985	0.6 msmt.
2	July 17	Boehringer, ...	413	1714	1.68	4.77	2878	0.6 msmt.
3	July 21	Boehringer, ...	337	1125	1.07	3.24	1208	0.6 msmt.
4	Sept. 12	Wilson & Taylor, ...	306	879	0.58	2.48	507	0.6 msmt.

DAILY MEAN GAGE HEIGHTS OF SCHUYLKILL RIVER AT CONSHOHOCKEN, MONTGOMERY COUNTY, PA.

1914.	JUNE.	JULY.	AUG.	SEPT.
DAY.	G H	G H	G H	G H
1,	.....	3.00	3.20	3.27
2,	.....	2.47	2.89	3.09
3,	.....	2.88	3.00	3.15
4,	.....	3.23	3.03	2.74
5,	.....	2.94	3.13	2.78
6,	.....	3.39	3.07	2.73
7,	.....	3.08	2.95	2.57
8,	2.58	3.91	3.01	2.26
9,	3.24	3.60	3.05	1.98
10,	3.04	3.25	2.81	1.75
11,	2.99	2.83	2.87	2.45
12,	3.02	2.87	3.29	2.33
13,	3.41	3.21	3.51	1.84
14,	2.88	3.39	3.37	1.54
15,	2.97	6.48	3.23	1.32
16,	2.82	5.09	2.63	1.46
17,	3.12	4.74	2.85	2.54
18,	3.00	4.38	2.07	3.54
19,	2.92	3.50	1.85	2.47
20,	2.93	†3.35	1.96	2.34
21,	2.78	3.20	2.89	2.10
22,	3.06	3.40	3.49	3.04
23,	2.83	3.35	3.33	3.28
24,	3.39	3.30	3.04	2.63
25,	3.14	3.14	2.78	3.49
26,	2.91	3.06	3.25	1.54
27,	3.34	2.94	3.06	1.72
28,	2.99	3.60	2.67	2.62
29,	3.10	3.98	2.47	2.67
30,	2.86	3.52	4.16	2.18
31,	.....	3.38	3.57	.....

†Interpolated.

DARBY CREEK.

DESCRIPTION OF BASIN.

Darby Creek, a tributary of the Delaware River, at Essington, Philadelphia County, drains approximately 78 square miles in Chester, Philadelphia and Delaware counties. Rising in the eastern part of Chester County, near Berwyn, it follows a general southeasterly direction, through a thickly populated, deforested, rolling agricultural region to the tidal swamps of the Delaware River, just below Darby Borough, where it turns southwestward along the western side of the swamp to its mouth, a total length of approximately 24 miles. Its source lies at an elevation of about 475 feet above sea level, and its mouth at sea level. In its upper section the slope of the stream is steep, while in the lower section it is very flat. The principal tributary is Cobbs Creek, which enters six miles above its mouth. A few mills operated by waterpower exist on this stream.

The mean annual precipitation over this watershed is from 45 to 50 inches.

The discharge has been measured since July 31st, 1911, at Lansdowne, approximately 8 miles above the mouth, above which point the tributary drainage area is 35 square miles.

DELAWARE BASIN—STATION NO. 20.

DARBY CREEK AT LANSDOWNE, PA.

DESCRIPTION OF STATION.

LOCATION—Near single span, iron highway bridge on road from Lansdowne to Upper Darby Township, Delaware County.

RECORDS AVAILABLE—Discharge measurements and gage heights from July 31, 1911, to September 30, 1914.

DRAINAGE AREA—35 square miles.

GAGE—A 10 foot staff gage is attached to a tree on the west bank about ¼ mile above highway bridge near green houses. There is also a high water staff gage, graduated above 5 feet, attached to a tree a short distance from low water gage. Both gages are referred to the same datum. The elevation of zero is arbitrary. Bench Mark No. 1 is on top of spike in groove cut in root of large white walnut tree on south bank, 15 paces from low water gage and 10 paces from high water gage, and is painted B. M., elevation 6.695 feet above gage datum. The gage is read twice daily by Charles H. Baker.

DISCHARGE MEASUREMENTS—Taken by wading below gage, or, during high stages, from the county highway bridge, ¼ mile below gage, or from the 3 arch bridge in Clifton Heights. The initial point on the county highway bridge is right end of upstream handrail.

CHANNEL—The channel is straight for 100 yards above and below the station. The right bank is sloping but does not overflow. The left bank is high and steep, and does not overflow. The bed is composed of mud, gravel and stones.

REMARKS—Slackwater from dam of Garrett Paper Mill extends to a point about 75 to 80 yards below where the gage is located.

DISCHARGE MEASUREMENTS OF DARBY CREEK AT LANSDOWNE, DELAWARE COUNTY, PA.

(Drainage area 35 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
9	Jan. 6	Boehringer & Shade,	55	63	0.98	1.55	62	Wading msmt. 100′ below gage.
10	June 10	Reckord & Taylor, ...	47	33	0.61	0.85	20	Wading msmt. 100′ below gage.
11	Sept. 11	Wilson & Taylor, ...	24	16	1.00	0.80	16	Wading msmt. 180′ below gage.

DAILY MEAN GAGE HEIGHTS OF DARBY CREEK AT LANSDOWNE, DELAWARE COUNTY, PA.

1914	JAN.	FEB.	MAR.	APRIL	MAY	JUNE	JULY	AUG.	SEPT.
DAY.	G H	G H	G H	G H	G H	G H	G H	G H	G H
1,	1.25	1.55	1.15	1.60	1.18	1.15	1.30	1.45	1.28
2,	1.35	1.30	1.25	1.30	1.25	1.45	2.05	1.35	1.13
3,	1.65	1.45	1.40	1.40	1.25	1.25	1.25	1.42	1.15
4,	2.50	1.25	1.25	1.50	1.25	1.50	1.18	1.20	1.25
5,	2.75	1.50	1.20	1.35	1.15	1.40	1.40	1.25	1.25
6,	1.75	1.60	1.25	1.40	1.32	1.15	1.30	1.10	1.18
7,	1.45	1.35	1.40	1.20	1.30	1.10	1.28	1.35	0.95
8,	1.20	1.30	1.20	1.65	1.30	0.95	1.45	1.18	1.15
9,	1.10	1.25	1.10	2.90	1.40	1.08	1.00	1.35	1.22
10,	0.95	1.35	1.25	1.90	1.15	1.00	1.02	1.10	1.05
11,	1.15	1.25	1.25	1.25	1.05	1.15	1.25	1.12	1.05
12,	1.25	1.30	1.05	1.30	1.35	1.32	1.30	1.30	1.00
13,	*1.55	1.50	1.35	1.25	2.80	1.25	1.45	1.13	1.04
14,	1.85	1.45	2.20	1.45	1.75	1.32	1.25	1.30	1.15
15,	1.90	1.25	3.20	1.75	1.35	1.25	2.00	1.05	1.15
16,	1.80	*1.45	†3.20	1.35	1.18	1.22	1.76	1.02	1.03
17,	1.75	1.30	3.10	1.35	1.25	1.35	1.77	1.18	1.22
18,	1.75	1.35	3.03	1.35	1.12	1.45	1.65	1.25	1.15
19,	1.75	1.35	1.95	1.20	1.10	1.35	1.25	1.25	1.05
20,	1.65	1.70	1.45	1.55	1.25	1.15	1.42	1.20	.....
21,	1.75	1.55	1.15	1.55	1.45	1.40	1.35	1.45	.....
22,	1.75	1.45	1.25	1.35	1.50	2.10	1.40	1.25	.....
23,	1.45	1.35	1.30	1.45	1.25	1.55	1.15	1.25	.....
24,	1.45	*1.25	1.45	1.30	1.15	2.72	1.38	1.15	.....
25,	2.60	1.45	1.40	2.10	0.98	1.75	1.60	1.35	.....
26,	1.45	1.45	1.35	5.80	1.15	1.45	1.15	1.35	1.12
27,	1.15	1.55	1.85	3.00	1.35	2.25	1.42	1.05	1.42
28,	1.10	1.35	3.10	1.95	1.10	3.20	2.48	1.25	1.20
29,	1.20	.....	3.20	1.55	1.00	2.35	1.40	1.28	0.92
30,	1.20	.....	1.55	1.45	1.30	1.80	1.22	1.35	1.02
31,	2.50	.....	1.30	.....	1.28	.....	1.40	1.22	.....

*Creek frozen Jan. 13-15 inclusive, and Feb. 16 and 24. †Maximum 4.40 at 6:00 p. m.

Brandywine Creek Looking Upstream from Gaging Station at Chadds Ford.

BRANDYWINE CREEK.

DESCRIPTION OF BASIN.

Brandywine Creek, a large tributory of the Delaware River, in Pennsylvania, which passes through the northern part of the State of Delaware, and enters the river just below Wilmington, drains approximately 300 square miles in Pennsylvania. Rising in two branches, the east and west, which head on the western edge of Chester County in the Welsh Mountains within a few miles of each other, these branches diverge, one passing through Downingtown, and the other through Coatesville, about 10 miles apart, and then meet about one mile north of Lenape, in the south-central part of Chester County. The stream and its branches flow in a general southerly direction through a rolling country, thickly populated, well developed agriculturally and practically deforested, its total length in Pennsylvania being about 35 miles. The elevation of the sources of the two branches is about 900 feet, at the state line it is 140 feet and at the mouth sea level. The slope of the stream is gradual, but steep enough to cause small waterpowers to be extensively developed along it and its branches. On the drainage basin lie numerous towns and villages, several of which obtain water from the branches.

The mean annual precipitation over this watershed is from 45 to 50 inches.

The discharge has been measured since August 1, 1911, at Chadds Ford, near the Pennsylvania-Delaware state line, about 10 miles above the mouth.

DELAWARE BASIN—STATION NO. 21.

BRANDYWINE CREEK AT CHADDS FORD, PA.

DESCRIPTION OF STATION.

LOCATION—On two span, iron girder bridge of P. R. R. over creek at Chadds Ford, Delaware County.

RECORDS AVAILABLE—Discharge measurements and gage heights from August 1, 1911, to September 30, 1914.

DRAINAGE AREA—285 square miles.

GAGE—A standard chain gage is attached to the upstream handrail. The length of chain from bottom of weight to marker is 23.97 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is outside upstream corner of left bridge seat stone, elevation 18.49 feet above gage datum. Bench Mark No. 2 is top of outer corner of stone, 5th step in left upstream wingwall from bridge seat, elevation 9.27 feet above gage datum. The gage is read twice daily by E. J. Reynolds.

DISCHARGE MEASUREMENTS—Taken from the upstream side of bridge. The initial point for soundings is cross mark cut in handrail at face of left abutment, upstream side.

CHANNEL—The channel is straight above the station for 50 yards, at which point a tail race enters the stream. The channel below the station is straight for 80 yards, and then curves to the west. The right bank of the natural creek is low and flat, but flood bank is high and steep. The left bank is high and steep. The bed is composed of mud, stones and gravel.

DISCHARGE MEASUREMENTS OF BRANDYWINE CREEK AT CHADDS FORD, DELAWARE COUNTY, PA.

(Drainage area 285 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
9	Jan. 6	Boehringer & Shade,	109	332	1.51	2.36	577	0.6 method.
10	June 10	Reckord & Taylor, ...	104	277	0.64	1.13	177	0.2 & 0.8 method.
11	July 16	Boehringer, ...	114	562	2.29	3.73	1285	Surf. msmt.
12	July 16	Boehringer, ...	113	515	2.15	3.36	1109	Surf. msmt.
13	July 16	Boehringer	110	436	1.67	2.67	730	0.6 msmt.
14	Sept. 11	Wilson & Taylor, ...	103	257	0.47	0.93	121	0.6 msmt.

DAILY MEAN GAGE HEIGHTS OF BRANDYWINE CREEK AT CHADDS FORD, DELAWARE COUNTY, PA.

1914.	JAN.	FEB.	MAR.	APRIL	MAY	JUNE	JULY	AUG.	SEPT.
DAY.	G H	G H	G H	G H	G H	G H	G H	G H	G H
1.	1.34	‡4.49	1.64	2.18	1.61	1.24	1.05	1.36	1.14
2.	1.34	2.42	1.64	2.39	1.59	1.21	1.50	1.24	1.12
3.	2.32	1.99	2.02	1.99	1.61	1.18	1.42	1.46	1.02
4.	3.62	1.92	2.36	1.85	1.61	1.19	1.23	1.40	1.02
5.	2.98	1.82	2.16	1.77	2.00	1.29	1.31	1.38	0.98
6.	2.35	1.73	1.91	1.76	2.19	1.21	1.29	1.32	0.95
7.	1.91	2.68	1.77	1.72	1.89	1.18	1.37	1.26	0.97
8.	1.78	2.08	1.75	1.73	1.75	1.18	1.25	1.23	1.00
9.	1.73	1.86	1.44	2.58	1.73	1.17	1.31	1.20	0.95
10.	1.70	1.70	1.59	1.91	1.68	1.18	1.17	1.18	0.92
11.	1.75	1.67	1.82	1.68	1.60	1.17	1.18	1.14	0.92
12.	1.72	1.65	1.74	1.68	1.55	1.14	1.17	1.30	0.90
13.	*1.60	1.62	2.04	1.61	1.92	1.10	1.15	1.36	0.90
14.	1.33	1.64	2.52	1.61	1.67	1.08	1.62	1.22	0.92
15.	1.66	1.63	3.80	1.75	1.57	1.10	§4.79	1.18	0.92
16.	1.60	1.64	5.50	2.53	1.49	1.10	3.18	1.09	0.92
17.	1.57	1.66	5.98	1.97	1.45	1.09	2.34	1.08	0.91
18.	1.52	1.68	4.82	1.71	1.45	1.08	1.57	1.17	0.89
19.	1.43	1.95	2.94	1.62	1.45	1.08	1.35	1.15	0.88
20.	1.42	2.45	2.62	1.78	1.42	1.16	1.26	1.07	0.90
21.	1.50	1.82	2.22	1.89	1.39	1.14	1.17	1.02	0.88
22.	1.42	1.76	2.18	1.69	1.36	1.64	1.15	1.36	0.89
23.	1.40	1.66	2.20	1.62	1.35	1.44	1.11	1.14	0.87
24.	3.34	1.62	2.18	1.49	1.33	1.36	1.15	1.06	0.86
25.	†5.01	1.76	2.22	1.47	1.33	1.22	1.41	1.10	0.94
26.	1.76	1.62	2.36	4.41	1.31	1.16	1.20	1.16	0.90
27.	1.71	1.62	2.30	2.59	1.35	1.20	1.09	1.12	0.84
28.	1.66	1.64	2.22	2.07	1.31	1.30	7.05	1.06	0.87
29.	1.68	.....	2.20	1.94	1.27	1.31	3.07	1.50	0.88
30.	1.68	.....	2.20	1.89	1.28	1.06	1.79	1.74	0.96
31.	2.67	.....	2.18	.....	1.27	.....	1.41	1.20	.....

*Creek frozen Jan. 13-17 inclusive. †Max. 6.20 at 8 a. m. ‡Max. 5.68 at 8 a. m. §Max. 7.18 at 4 p. m.

SUSQUEHANNA BASIN

NORTH BRANCH OF SUSQUEHANNA RIVER.

DESCRIPTION OF BASIN.

The North Branch of the Susquehanna River, which joins the West Branch at Northumberland to form the main Susquehanna River, drains a total area of 11,485 square miles, of which 6,270 lie in Pennsylvania, and 5,215 in New York State. This Branch rises in the Catskill Mountains, in southeastern New York, close to the headwaters of the Delaware River, flows in a general southwesterly course into Pennsylvania near the northeastern corner of the state, and, forming a loop about 16 miles in length, again enters New York State, where it continues westerly, finally turning southward into Pennsylvania, just north of Sayre, Bradford County, and follows a southeasterly course to Wilkes-Barre, and thence southwesterly to its junction with the West Branch. The total length of the river, to the forks at Oneonta, N. Y., is approximately 290 miles. From its headwaters to near where it crosses into Pennsylvania for the second time, this stream flows through a well populated, agricultural area, the mountains being fairly well covered with second growth timber, the channel lying in a narrow valley. Just above Sayre the river flows through a wide, open, thickly settled, farming country, but as it enters Pennsylvania it changes to a narrow valley, bounded by hills 400 to 600 feet high, and thus continues, passing now and then through broad flats, to its mouth.

The upper part of the watershed in Pennsylvania is thinly inhabited and not extensively farmed, the mountains being usually covered with second growth timber, but from the mouth of the Lackawanna River, 10 miles above Wilkes-Barre, to its mouth, the basin is densely settled. In this section lies the Wyoming Valley anthracite coal field. Four cities, Pittston, Scranton, Carbondale and Wilkes-Barre, many large boroughs and numerous farming and mining villages are found in this drainage area in Pennsylvania, besides which some cities and boroughs of New York State also lie in this watershed.

The slope of the stream in Pennsylvania is not steep, flowing, as it does, through a succession of rapids and pools, and follows a uniform rate of fall of about two feet per mile to its mouth. All but a small portion of the basin, near the mouth, lies within the glacial area. The sub-basins, lying within the glacial area, abound in lakes, ponds and swamps, and a few of these basins are still well forested.

The principal tributaries in New York are the Chenango and Unadilla rivers, and in Pennsylvania the Chemung and Lackawanna rivers, Towanda, Wyalusing, Tunkhannock and Fishing creeks.

DISCHARGE TABLE FOR NORTH BRANCH SUSQUEHANNA RIVER AT CONKLIN, N. Y., FROM APRIL 1, 1914.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet	Sec. ft.	Feet	Sec. ft.	Feet	Sec. ft.	Feet	Sec. ft.	Feet	Sec. ft.
2.00	260	.90	1810	.80	5060	.70	9495	.60	14570
.10	310	4.00	1940	.90	5275	.80	9745	.70	14870
.20	360	.10	2070	6.00	5495	.90	9995	.80	15180
.30	410	.20	2210	.10	5715	8.00	10250	.90	15490
.40	470	.30	2360	.20	5940	.10	10505	10.00	15800
.50	530	.40	2510	.30	6170	.20	10760	.10	16120
.60	600	.50	2670	.40	6400	.30	11015	.20	16440
.70	670	.60	2830	.50	6630	.40	11275	.30	16760
.80	740	.70	2990	.60	6860	.50	11535	.40	17080
.90	810	.80	3160	.70	7095	.60	11795	.50	17400
3.00	890	.90	3330	.80	7330	.70	12055	60	17730
.10	970	5.00	3500	.90	7565	.80	12300	.70	18060
.20	1060	.10	3680	7.00	7800	.90	12585	.80	18390
.30	1150	.20	3860	.10	8035	9.00	12850	.90	18720
.40	1250	.30	4040	.20	8275	.10	13120	11.00	19050
.50	1350	.40	4230	.30	8515	.20	13400		
.60	1460	.50	4430	.40	8755	.30	13680		
.70	1570	.60	4635	.50	9000	.40	13970		
.80	1690	.70	4845	.60	9245	.50	14270		

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF NORTH BRANCH SUSQUEHANNA RIVER AT CONKLIN, N. Y.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	3.6	1500	8.3	10500	4.6	1210	12.2	27200	7.7	9500	3.35	1200	3.5	1350	2.8	740	4.7	2990
2,	3.45	1350	7.7	9000	4.6	1210	12.6	24800	7.5	9000	3.3	1150	3.25	1100	2.8	740	4.1	2070
3,	3.25	1170	6.3	5720	4.4	1210	13.0	26400	6.4	6400	3.25	1100	3.25	1100	2.8	740	4.5	2670
4,	3.3	1210	6.1	5280	4.5	1210	11.7	21500	6.0	5500	3.2	1060	2.65	685	2.75	705	4.9	3330
5,	3.35	1260	5.9	4840	4.5	1210	9.4	14000	5.9	5280	3.45	1300	2.6	600	2.75	705	4.3	2360
6,	3.35	1260	5.7	4430	4.5	1210	8.3	11000	8.8	12300	3.5	1350	3.1	970	2.75	705	3.9	1810
7,	3.15	1060	5.2	3500	4.5	1210	7.8	9740	7.8	9740	3.45	1300	3.25	1100	2.7	670	3.7	1570
8,	3.15	1080	4.8	2540	4.5	1350	9.6	14600	6.7	7100	4.1	2070	3.2	1060	2.75	705	3.6	1460
9,	3.05	991	4.0	1600	4.4	1260	13.6	28900	6.3	6170	4.5	2670	3.6	1350	2.6	600	3.35	1200
10,	3.2	1120	4.0	1170	4.3	1170	13.6	28900	6.1	5720	4.6	2830	4.5	2670	2.6	600	3.3	1150
11,	3.2	1120	4.0	868	4.2	1120	10.5	17400	5.7	4840	4.0	1940	4.8	3160	2.55	565	3.2	1060
12,	3.25	1170	4.4	805	4.2	1080	9.4	14000	6.4	6400	3.6	1460	5.2	3880	2.7	670	3.1	970
13,	3.9	1180	5.2	1170	4.1	991	8.8	12300	9.0	12800	3.9	1810	5.4	4230	4.0	1940	3.05	980
14,	3.9	1180	5.3	1170	4.1	948	8.1	10500	9.3	13700	3.2	1060	4.9	3330	3.6	1460	2.9	810
15,	3.8	1180	5.4	1210	4.1	948	7.6	9240	7.7	9500	3.1	970	4.6	2830	3.2	1060	2.8	740
16,	3.8	1180	5.5	1210	4.2	1080	8.4	11300	6.5	6680	3.0	890	4.2	2210	3.05	930	2.75	705
17,	3.8	1180	5.6	1210	4.7	1600	8.6	11800	6.1	5720	2.95	850	3.8	1690	3.0	890	2.7	670
18,	3.6	1180	5.5	1170	5.8	3000	8.2	10800	5.7	4840	2.95	850	6.1	5720	2.9	810	2.65	635
19,	3.6	1180	5.5	1120	7.3	6170	7.8	9740	5.3	4040	2.9	810	6.3	6170	3.2	1060	2.6	600
20,	3.5	948	5.4	1080	7.2	4840	10.8	18400	5.3	4040	2.9	810	4.1	2070	5.3	4040	2.55	565
21,	3.6	991	5.3	948	6.3	2840	13.1	26800	4.8	3160	2.9	810	3.8	1690	5.8	5060	2.55	565
22,	3.5	948	5.2	866	6.0	1970	12.6	24800	4.5	2670	2.95	850	3.6	1460	6.8	7330	2.46	506
23,	3.45	907	5.1	754	5.8	1600	10.3	16800	4.4	2510	2.95	850	3.5	1350	5.7	4840	2.42	482
24,	3.4	790	5.0	685	5.5	1280	8.4	11300	4.3	2360	2.95	850	3.45	1300	4.7	2990	2.55	565
25,	3.7	1120	4.9	652	5.3	1080	7.5	9000	4.1	2070	3.0	890	3.7	1570	4.5	2670	2.6	600
26,	3.8	1210	4.7	1210	7.6	6680	7.5	9000	3.9	1810	3.0	890	3.6	1460	4.1	2070	2.75	705
27,	3.8	1210	4.7	1210	11.8	21800	9.0	12800	4.0	1940	2.95	850	3.4	1250	3.8	1690	2.7	670
28,	4.0	1450	4.6	1210	17.0	44700	8.2	10800	3.9	1810	2.9	810	3.25	1100	3.6	1460	2.65	635
29,	4.4	1970	.....	.....	17.4	46700	7.5	9000	3.9	1810	3.4	1250	3.15	1020	3.45	1300	2.5	580
30,	5.4	3680	.....	.....	17.3	46200	7.7	9500	3.5	1350	3.3	1150	3.25	1100	3.8	1690	2.5	530
31,	7.1	7560	.....	.....	14.6	33200	.....	.....	3.45	1300	.....	.....	3.0	890	4.6	2830	.....	.....

Gage heights affected by ice Jan. 13 to March 26 inclusive. Daily discharge given in this period is only approximate. Mean discharge Jan. 13 to 19 inclusive, estimated 1180 sec. ft. Mean discharge Feb. 26 to March 7, estimated 1210 sec. ft.

ESTIMATED MONTHLY DISCHARGE OF NORTH BRANCH SUSQUEHANNA RIVER AT CONKLIN, N. Y.

(Drainage area 2,350 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	7560	790	1450	0.617	0.71
February,	10500	652	2379	1.01	1.05
March,	46700	948	7830	3.33	3.84
April,	23900	9000	15700	6.68	7.45
May,	13700	1300	5550	2.36	2.72
June,	2330	810	1220	0.519	0.58
July,	6170	600	1980	0.843	0.97
August,	7330	565	1750	0.745	0.86
September,	3330	432	1140	0.485	0.54

Note:—Gage heights affected by ice Jan. 13 to Mar. 26 inclusive. Daily discharge given in this period is only approximate. Mean discharge Jan. 13 to 19 inclusive, estimated 1180 sec. ft. Mean discharge Feb. 26 to Mar. 7, estimated 1210 sec. ft.

CHENANGO RIVER.

DESCRIPTION OF BASIN.

Chenango River rises in the central part of Madison County, New York, and flows southward into the Susquehanna River at Binghamton, N. Y. It is approximately seventy miles long and its drainage area comprises about 1,580 square miles. Its headwater valleys lie at an elevation of about 1,200 feet above sea level, and its mouth is 864 feet. Its bed is, as a rule, composed of sand and gravel and the stream is bordered, in many places, by bottom land, subject to overflow. A portion of the headwaters are diverted across the Chenango-Mohawk Divide, through Oriskany Creek, to feed the summit level of the Erie Canal.

Considerable power is developed at Binghamton and at Port Dickinson, three miles above.

The mean annual precipitation over this water shed is from 35 to 40 inches.

The discharge of this stream was measured from July 31, 1901, to December 31, 1911, at Binghampton, N. Y., near its mouth, although several discharge measurements were obtained during 1912. Since November 11, 1912, the discharge has been measured near Chenango Forks, N. Y.

SUSQUEHANNA BASIN—STATION NO. 2.

CHENANGO RIVER NEAR CHENANGO FORKS, NEW YORK.

DESCRIPTION OF STATION.

LOCATION—On highway bridge two miles below Chenango Forks Post Office, 1.5 miles below the mouth of Tioughnioga River (coming in from the right) and 12 miles above the mouth of river at Binghamton, N. Y.

RECORDS AVAILABLE—Discharge complete from November 11, 1912, to September 30, 1914.

DRAINAGE AREA—1,420 square miles.

GAGE—Inclined staff gage on left bank. The gage is read by Erastus Ingraham.

DISCHARGE MEASUREMENTS—Low water measurements made by wading near the gage.

CHANNEL—One channel at all stages; bed of stream small cobble filled in with sand and gravel; not liable to shift; current uniform across the entire section.

WINTER FLOW—Gage heights somewhat affected by ice during ordinary winters.

REMARKS—This station was established to supercede the station on the Chenango River, at Binghamton, N. Y., which station was influenced by backwater from the North Branch of the Susquehanna River. The data on this station have been furnished by the United States Geological Survey, who maintain and operate this station.

DISCHARGE MEASUREMENTS OF CHENANGO RIVER NEAR CHENANGO FORKS, N. Y.

(Drainage area 1,420 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
6	Jan. 7	DeGolyer, ...	320	750	1.12	3.34	842	0.2 & 0.8 msmt.
7	Jan. 7	DeGolyer, ...	320	773	1.18	3.40	915	0.2 & 0.8 msmt.
8	Jan. 22	DeGolyer, ...	312	788	1.00	3.98	788	Msmt. under ice cover.
9	Jan. 24	DeGolyer, ...	312	784	0.96	3.94	750	Msmt. under ice cover.
10	Jan. 31	DeGolyer, ...	365	1800	3.39	6.43	6100	0.2 & 0.8 msmt.
11	Feb. 20	Barnes, ...	280	1100	0.78	6.50	814	Msmt. under ice cover.
12	Mar. 9	Covert, ...	390	796	1.04	4.60	830	Msmt. under ice cover.
13	Mar. 20	DeGolyer, ...	392	1250	1.66	5.61	2080	Msmt. under ice cover.
14	Mar. 23	Barnes, ...	387	1120	1.68	5.24	1880	Msmt. under ice cover.
15	Mar. 29	Barnes, ...	540	4900	6.43	12.91	31500	0.2 & 0.8 msmt.
16	Mar. 29	Barnes, ...	530	4740	6.21	12.50	29400	0.2 & 0.8 msmt.
17	Apr. 3	Barnes, ...	390	3110	5.58	9.58	17300	0.2 & 0.8 msmt.
18	Apr. 3	Barnes, ...	380	2370	4.35	7.60	10300	0.2 & 0.8 msmt.
19	July 26	DeGolyer, ...	391	636	1.71	3.55	1090	Wading 300' below gage.

DISCHARGE TABLE FOR CHENANGO RIVER NEAR CHENANGO FORKS, N. Y., FROM NOV. 11, 1912.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet	Sec. ft.	Feet	Sec. ft.	Feet	Sec. ft.	Feet	Sec. ft.	Feet	Sec. ft.
2.30	92	.60	2790	7.00	8500	.40	16600	.80	26200
.30	122	.70	2970	.10	8800	.50	17000	.90	26600
.40	178	.80	3160	.20	9100	.60	17400	12.00	27000
.50	230	.90	3350	.30	9400	.70	17800	.10	27500
.60	286	5.00	3550	.40	9700	.80	18200	.20	28000
.70	348	.10	3750	.50	10000	.90	18600	.30	28500
.80	416	.20	3960	.60	10300	10.00	19000	.40	29000
.90	491	.30	4170	.70	10600	.10	19400	.50	29500
3.00	572	.40	4390	.80	10900	.20	19800	.60	30000
.10	660	.50	4610	.90	11200	.30	20200	.70	30500
.20	750	.60	4840	8.00	11500	.40	20600	.80	31000
.30	850	.70	5070	.10	11800	.50	21000	.90	31500
.40	960	.80	5310	.20	12100	.60	21400	13.00	32000
.50	1080	.90	5550	.30	12400	.70	21800	.10	32500
.60	1200	6.00	5800	.40	12700	.80	22200	.20	33000
70	1330	.10	6050	.50	13000	.90	22600	.30	33500
80	1470	.20	6310	.60	13400	11.00	23000	.40	34000
90	1620	.30	6570	.70	13800	.10	23400	.50	34500
1.00	1780	.40	6830	.80	14200	.20	23800	.60	35000
.10	1940	.50	7100	.90	14600	.30	24200	.70	35500
.20	2100	.60	7370	9.00	15000	.40	24600	.80	36000
.30	2270	.70	7650	.10	15400	.50	25000	.90	36500
.40	2440	.80	7930	.20	15800	.60	25400	14.00	37000
.50	2610	.90	8210	.30	16200	.70	25800		

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF CHENANGO RIVER NEAR CHENANGO FORKS, N. Y.

1912. DAY.	NOV. G H	NOV. Dis.	DEC. G H	DEC. Dis.
1.	.....	.....	4.0	1780
2.	.....	.....	4.1	1940
3.	.....	.....	7.2	9100
4.	.....	.....	7.3	9400
5.	.....	.....	6.3	6570
6.	.....	.....	7.0	8500
7.	.....	.....	7.0	8500
8.	.....	.....	6.0	5800
9.	.....	.....	5.0	3550
10.	.....	.....	4.45	2520
11.	5.2	3960	4.25	2180
12.	4.05	1860	4.1	1940
13.	4.1	1940	4.0	1780
14.	4.25	2180	3.4	960
15.	4.15	2020	4.0	1780
16.	4.3	2270	3.5	1060
17.	4.25	2180	3.5	1080
18.	4.0	1780	3.4	960
19.	4.0	1780	4.3	2270
20.	4.0	1780	5.0	3550
21.	4.0	1780	5.2	3960
22.	4.0	1780	4.9	3350
23.	4.0	1780	4.15	2020
24.	3.5	1080	4.0	1780
25.	3.75	1400	4.05	1860
26.	4.0	1780	3.95	1700
27.	4.0	1780	4.0	1780
28.	4.0	1780	3.85	1540
29.	4.0	1780	3.85	1540
30.	4.0	1780	3.95	1700
31.	.....	.....	4.8	3160

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF CHENANGO RIVER NEAR CHENANGO FORKS, N. Y.

1913.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.		OCT.		NOV.		DEC.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	4.9	3350	4.8	3160	....	.....	6.4	6830	3.45	1020	4.8	3160	2.68	336	2.42	188	2.3	132	2.4	178	3.10	660	4.0	1780
2,	4.4	2440	4.4	2440	....	.....	5.8	5310	3.4	960	3.7	1330	2.6	286	2.38	169	2.3	132	2.42	188	2.96	531	3.8	1470
3,	5.2	3960	4.3	2270	....	.....	5.3	4170	3.2	750	3.55	1140	2.62	336	2.35	155	2.3	132	2.42	188	2.94	523	3.6	1200
4,	8.4	12700	4.2	2100	....	.....	5.2	3960	3.2	750	3.45	1020	2.65	317	2.4	178	2.35	155	2.38	169	2.85	453	3.5	1080
5,	6.8	7980	4.2	2100	....	.....	5.2	3960	3.2	750	3.4	960	2.65	317	2.4	178	2.35	155	2.4	178	2.92	507	3.5	1080
6,	6.8	7980	3.9	1620	....	.....	5.1	3750	3.15	705	3.35	890	2.65	317	2.35	155	2.35	155	2.45	204	2.95	531	3.4	960
7,	8.6	13400	3.45	1020	....	.....	4.8	3160	3.1	660	3.25	800	2.65	317	2.32	141	2.3	132	2.42	188	2.88	476	3.4	960
8,	10.1	19400	3.45	1020	....	.....	4.7	2970	3.1	660	3.3	850	2.65	317	2.3	132	2.3	132	2.45	204	2.8	416	3.7	1230
9,	9.0	15000	3.25	800	....	.....	4.6	2790	3.05	616	3.2	750	2.65	317	2.32	141	2.3	132	2.48	220	2.92	507	4.2	2100
10,	6.9	8210	3.25	800	5.6	4840	4.4	2440	3.0	572	3.3	850	2.65	317	2.35	155	2.22	100	2.32	141	4.65	1860	3.7	1230
11,	6.3	6570	3.1	660	7.3	9400	4.6	2790	3.0	572	3.3	850	2.6	286	2.3	132	2.2	92	2.38	169	5.1	3750	3.65	1360
12,	8.3	12400	....	.....	7.1	8800	5.4	4390	3.0	572	3.0	572	2.6	286	2.3	132	2.2	92	2.35	156	4.9	3350	3.7	1330
13,	7.4	9700	....	.....	5.7	5070	5.1	3750	3.0	572	2.9	491	2.68	336	2.35	155	2.2	92	2.48	220	5.6	4840	3.4	960
14,	6.2	6310	....	.....	7.2	9100	4.8	3160	2.91	499	2.8	416	2.6	286	2.4	178	2.28	124	2.48	220	5.0	3550	3.6	1200
15,	5.8	5310	....	.....	7.9	11200	4.6	2790	2.75	382	2.86	461	2.62	298	2.28	124	2.2	92	2.4	178	4.2	2100	3.9	1620
16,	5.6	4840	....	.....	7.8	10900	4.5	2610	2.76	389	2.86	453	2.55	258	2.3	132	2.2	92	2.45	204	3.95	1700	3.6	1200
17,	6.5	7100	....	.....	6.2	6310	4.3	2270	2.9	491	2.81	423	2.5	230	2.3	132	2.22	100	2.34	150	4.1	1940	3.6	1200
18,	8.0	11500	....	.....	5.4	4390	4.1	1940	2.92	507	2.8	416	2.5	230	2.28	124	2.32	141	2.42	188	3.95	1700	3.6	1200
19,	8.2	12100	....	.....	5.3	4170	4.0	1780	2.94	523	2.8	416	2.48	220	2.25	112	2.4	178	2.48	220	3.8	1470	3.45	1020
20,	7.0	8500	....	.....	6.3	6570	3.95	1700	2.91	499	2.8	416	2.46	209	2.22	100	2.48	220	2.58	276	3.75	1400	3.3	850
21,	7.0	8500	....	.....	6.0	5800	3.8	1470	2.92	507	2.82	431	2.52	241	2.2	92	2.58	276	3.5	1080	3.9	1620	3.2	750
22,	6.3	6570	....	.....	6.4	6830	3.65	1260	2.93	556	2.82	431	2.52	241	2.25	113	2.72	362	3.8	1470	4.3	2270	3.4	960
23,	5.6	4840	....	.....	5.4	4390	3.6	1200	3.35	905	2.8	416	2.51	235	2.35	156	2.68	336	3.8	1470	4.05	1860	3.55	1140
24,	6.0	5800	....	.....	5.2	3960	3.6	1200	4.4	2440	2.8	416	2.5	230	2.32	141	2.58	275	3.7	1330	4.3	2270	3.85	1540
25,	5.7	5070	....	.....	6.9	8210	3.6	1200	3.9	1620	2.75	382	2.52	241	2.35	155	2.5	230	3.5	1080	4.2	2100	3.9	1620
26,	5.2	3960	....	.....	10.8	22200	3.55	1140	3.5	1080	2.75	382	2.5	230	2.32	141	2.55	258	3.4	960	3.9	1620	3.8	1470
27,	5.2	3960	....	.....	13.4	34000	3.4	960	3.55	1140	2.8	416	2.42	188	2.35	155	2.5	230	3.3	850	3.8	1470	3.5	1080
28,	4.8	3160	....	.....	11.8	26200	3.4	960	3.75	1400	2.7	348	2.45	204	2.35	155	2.5	230	3.3	850	3.6	1200	3.3	870
29,	4.6	2790	....	.....	9.0	15000	3.4	960	4.8	3160	2.8	416	2.45	204	2.35	155	2.5	230	3.2	750	3.7	1330	3.4	960
30,	4.2	2100	....	.....	7.4	9700	3.5	1080	4.7	2970	2.8	416	2.45	204	2.35	155	2.5	230	3.1	660	3.9	1620	3.6	1200
31,	4.6	2790	....	.....	6.6	7870	....	.....	4.2	2100	....	.....	2.48	220	2.35	155	....	.....	3.05	616	....	.....	3.7	1330

Ice conditions Feb. 12th to March 9th and discharge estimated from comparative studies.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF CHENANGO RIVER NEAR CHENANGO FORKS, N. Y.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	3.6	1200	.....	10600	.....	660	9.9	18600	5.4	4390	3.3	850	3.5	1080	2.75	382	4.2	2100
2,	3.4	960	.....	6830	.....	616	10.2	19800	5.0	3550	3.6	1200	3.25	800	2.72	362	4.0	1780
3,	3.4	960	.....	4840	.....	616	9.6	17400	4.6	2790	3.5	1080	3.0	572	2.65	317	5.0	3550
4,	3.4	960	.....	5070	.....	616	7.9	11200	4.45	2520	3.4	960	3.2	750	2.8	416	4.9	3350
5,	3.4	960	.....	4390	.....	660	7.0	8500	4.7	2970	3.2	750	2.95	531	2.82	431	4.15	2020
6,	.....	905	.....	3160	.....	750	6.4	6830	6.2	6310	3.2	750	2.9	491	2.72	362	3.85	1540
7,	.....	905	.....	2440	.....	800	6.2	6310	5.1	3750	3.2	750	2.9	491	2.7	348	3.7	1330
8,	.....	800	.....	1940	.....	850	8.8	14200	4.5	2610	3.7	1330	2.9	491	2.78	403	3.6	1200
9,	.....	800	.....	1330	.....	830	11.1	23400	4.6	2790	3.8	1470	2.95	531	2.75	382	3.4	980
10,	.....	850	.....	1080	.....	800	9.2	15800	4.35	2360	3.5	1080	3.1	660	2.7	348	3.3	850
11,	.....	905	.....	850	.....	660	7.8	10900	4.3	2270	3.4	960	2.9	491	2.88	476	3.25	800
12,	.....	568	.....	750	.....	616	7.6	10800	4.5	2610	3.2	750	2.9	491	3.1	660	3.2	750
13,	.....	568	.....	660	.....	616	7.1	8800	8.2	12100	3.1	660	2.9	491	3.0	572	3.1	660
14,	.....	568	.....	750	.....	616	6.6	7370	6.8	7980	3.0	572	2.9	491	2.88	476	3.05	616
15,	.....	568	.....	705	.....	616	6.5	7100	5.6	4840	2.95	531	2.9	491	2.82	431	3.0	572
16,	.....	568	.....	750	.....	705	7.2	9100	5.1	3750	2.82	431	2.9	491	2.8	416	2.95	531
17,	.....	568	.....	750	.....	1080	7.0	8500	4.7	2970	2.90	491	2.9	491	2.7	348	2.91	499
18,	.....	568	.....	800	.....	2180	6.7	7650	4.45	2520	2.9	491	3.35	905	2.8	416	2.86	461
19,	.....	850	.....	800	.....	2520	6.6	7370	4.25	2180	2.9	491	3.6	1200	2.95	531	2.85	453
20,	.....	705	.....	750	.....	1940	8.2	12100	4.1	1940	2.9	491	3.1	660	3.0	572	2.82	431
21,	.....	438	.....	660	.....	1780	8.6	13400	3.95	1700	2.95	531	3.0	572	5.7	5070	2.82	431
22,	.....	788	.....	531	.....	1780	7.6	10800	3.8	1470	3.0	572	2.98	556	5.4	4890	2.8	416
23,	.....	800	.....	416	.....	1780	6.6	7370	3.75	1400	2.92	507	2.92	507	4.45	2520	2.82	431
24,	.....	800	.....	381	.....	1940	5.9	5550	3.7	1330	2.9	491	2.98	556	4.1	1940	2.92	507
25,	.....	800	.....	453	.....	2180	5.4	4390	3.6	1200	2.9	491	3.1	660	3.8	1470	2.88	476
26,	.....	800	.....	453	.....	5800	6.4	6830	3.55	1140	2.85	453	3.2	750	3.6	1200	2.9	491
27,	.....	800	.....	556	11.5	25000	6.8	7980	3.5	1080	2.8	416	2.95	531	3.45	1020	2.84	446
28,	.....	800	.....	705	13.1	32500	6.1	6060	3.5	1080	2.85	453	2.82	431	3.3	870	2.8	416
29,	.....	1470	.....	.....	13.1	32500	5.7	5070	3.4	960	5.2	3960	2.75	382	3.7	1330	2.8	416
30,	.....	3550	.....	.....	11.3	24200	5.9	5550	3.4	960	4.1	1940	2.75	382	4.7	2970	2.85	453
31,	.....	6830	.....	.....	10.3	20200	.....	.....	3.35	905	.....	.....	2.8	416	4.5	2610	.....	.....

Gage heights affected by ice Jan. 6 to March 26 inclusive. Discharge during this period is only approximate. Mean discharge Jan. 12 to 18 inclusive, estimated 568 sec. ft.

ESTIMATED MONTHLY DISCHARGE OF CHENANGO RIVER NEAR CHENANGO FORKS, N. Y.

(Drainage area 1,420 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1912.					
November, 11-30,	3960	1080	1920	1.35	1.00
December,	8500	960	3210	2.26	2.61
a1913.					
January,	19400	2100	7360	5.18	5.97
February,	3160	.....	1260	0.887	0.92
March,	34000	.....	7870	5.54	6.39
April,	6330	960	2600	1.83	2.04
May,	3160	33[illegible]	978	0.689	0.79
June,	3160	348	688	0.485	0.54
July,	336	188	266	0.187	0.22
August	188	92	145	0.102	0.12
September,	362	92	175	0.123	0.14
October,	1470	141	482	0.339	0.39
November,	4840	416	1650	1.16	1.29
December,	2100	750	1230	0.866	1.00
The year,	34000	.....	2060	1.449	19.81
b1914.					
January,	6830	.....	1080	0.761	0.88
February,	10600	416	1910	1.35	1.41
March,	23000	616	5430	3.82	4.40
April,	23400	4390	10120	7.13	7.96
May,	13100	905	2920	2.06	2.38
June,	3960	416	863	0.608	0.68
July,	1200	281	592	0.417	0.48
August,	5070	316	1100	0.775	0.89
September,	3550	416	965	0.680	0.76

a—Discharge Feb. 12th to March 9th inclusive, estimated from comparative studies.
b—Gage heights affected by ice Jan. 6 to March 26 inclusive. Discharge during this period is only approximate. Mean discharge Jan. 12 to 18 inclusive, estimated 568 sec. ft.

CHEMUNG RIVER.

DESCRIPTION OF BASIN.

The Chemung River is formed near Painted Post, in the southeastern part of Steuben County, N. Y., by the confluence of Cohocton and Tioga rivers. Cohocton River, the north branch, drains the opposite or southern slope of the divide at the head of the Keuka and Canadaigua lakes. Its drainage area lies wholly in the State of New York, principally in Steuben County and comprises approximately 630 square miles above the mouth. Tioga River rises in Tioga County, Pa., and flows northward, crossing the state line near Lawrenceville, Pa. The last fifteen miles of its course lie in New York State. It has about 1,330 square miles of drainage area

above its mouth, 689 of which lie in Pa. About five miles from its mouth the Tioga River receives, from the left, Canisteo River, which rises in the northeast corner of Allegheny County, N. Y., and flows in a southeasterly direction, draining, with its tributaries, the southern part of Steuben County. Its drainage area comprises about 540 square miles.

The Chemung River flows southeastward through Corning, Elmira and Chemung, crosses the state line and flows for approximately two and one-half miles in Pa., returns to New York for approximately two and one-half miles, and crosses again to Pa. near Waverly, emptying into the Susquehanna River near Athens, Bradford County, Pa. The total length of the river proper is about forty miles, of which thirty miles lie in New York; the drainage area at the mouth being approximately 2,520 square miles, 832 of which are in Pennsylvania.

The Chemung River is sluggish throughout its course, flowing over a wide, gravelly bed, in a series of rifts and pools, and one or the other of the banks is usually low and subject to frequent overflow. The hills bordering the river rise to a height of several hundred feet on either side, within a short distance of the stream. The upland plateau is, to a large extent, wooded, has impervious soil, no lake storage and few marsh areas. Tributaries are ramifying and uniformly distributed, though not very numerous, and dry gullies, or flood channels, are common. The principal tributaries in Pennsylvania are Seely Creek, South Creek and Bentley Creek, all of which join the river in New York State.

In its watershed in Pennsylvania lie the boroughs of Athens, Sayre and South Waverly, while in New York are Corning, Elmira, Chemung and Waverly.

The mean annual precipitation over this watershed is from 35 to 40 inches.

The discharge of this stream has been measured since Sept. 7, 1903, at Chemung, approximately 10 miles above its mouth.

SUSQUEHANNA BASIN—STATION NO. 3.

CHEMUNG RIVER AT CHEMUNG, NEW YORK.

DESCRIPTION OF STATION.

LOCATION—On two span, steel structure, midway between Chemung, N. Y., and Wilawanna, Pa., near the state line.

RECORDS AVAILABLE—Discharge complete from September 7, 1903 to December 31, 1913, and discharge measurements and gage heights January 1, to September 30, 1914.

DRAINAGE AREA—2,440 square miles.

GAGE—A tape and weight gage is attached to the upstream side of the bridge near the right bank. The elevation of zero is arbitrary. The length of tape is 29.59 feet. Bench Mark No. 1 is formed by three nails driven into a telegraph pole 70 feet to the right of the initial point for soundings, about 30 feet upstream; the pole is marked with black paint "U. S. G. S. B. M." elevation 29.88 feet above gage datum. The gage is read by D. L. Orcutt.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is face of right abutment, downstream side.

CHANNEL—The channel above and below the station is straight for 700 feet and 800 feet respectively. The right bank is high, cleared and not subject to overflow. The left bank is of medium height, wooded and overflows during extreme high stages. The bed is composed of gravel.

REMARKS—The smooth water reaches of the stream become ice covered in winter while needle ice forms over the rapids and is carried under the surface ice. The following data have been furnished by the United States Geological Survey:

DISCHARGE MEASUREMENTS OF CHEMUNG RIVER AT CHEMUNG, N. Y.

(Drainage area 2,440 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
44	Mar. 24	Barnes,	267	1420	1.80	4.30	2560	0.2 & 0.8 msmt.
45	Mar. 31	Barnes,	389	1660	6.26	11.40	25400	0.2 & 0.8 msmt.
46	Sept. 24	Fear,	246	294	0.93	2.01	274	0.2 & 0.8 msmt.
47	Sept. 24	DeGolyer,	261	293	0.96	1.99	252	Wading 600' below gage.

DAILY MEAN GAGE HEIGHTS OF CHEMUNG RIVER AT CHEMUNG, N. Y.

1914. DAY.	JAN. G H	FEB. G H	MARCH. G H	APRIL. G H	MAY. G H	JUNE. G H	JULY. G H	AUG. G H	SEPT. G H
1,	.....	11.00	.....	9.10	4.70	3.25	2.35	1.96	2.35
2,	.....	7.50	.....	10.20	4.40	3.10	2.30	1.96	2.75
3,	.....	6.50	.....	9.70	4.10	3.03	2.24	1.96	3.90
4,	4.30	7.00	.....	7.80	3.90	2.95	2.20	1.90	4.20
5,	4.20	7.10	.....	6.80	4.20	3.20	2.18	1.93	3.60
6,	.....	5.70	.....	6.10	11.40	3.25	2.16	1.92	3.30
7,	.....	5.20	.....	5.80	8.90	3.10	2.14	1.87	3.00
8,	.....	4.80	.....	10.60	6.80	2.95	2.12	1.89	2.80
9,	.....	3.90	.....	11.60	7.50	2.85	2.12	2.39	2.70
10,	.....	3.70	.....	8.80	8.30	2.95	2.20	2.46	2.60
11,	.....	3.70	.....	7.80	6.70	2.80	2.24	2.21	2.48
12,	.....	.....	.....	7.20	9.20	2.75	2.46	2.12	2.43
13,	.....	.....	.....	6.50	15.10	2.65	2.46	2.08	2.36
14,	.....	.....	.....	5.90	12.30	2.60	2.36	2.09	2.32
15,	.....	.....	.....	5.60	8.40	2.50	2.32	2.12	2.26
16,	.....	.....	.....	8.30	6.90	2.49	2.38	2.02	2.20
17,	.....	.....	8.10	9.00	6.00	2.42	2.30	2.06	2.16
18,	.....	.....	9.20	7.80	5.40	2.36	2.90	2.01	2.12
19,	.....	.....	6.20	6.90	5.00	2.34	2.48	2.80	2.08
20,	.....	.....	5.60	6.60	4.60	2.38	2.24	3.70	2.04
21,	.....	.....	5.00	7.70	4.40	2.38	2.21	5.10	2.05
22,	.....	.....	4.80	6.50	4.10	2.42	2.12	6.00	2.04
23,	.....	.....	4.50	5.90	3.90	2.40	2.09	4.30	1.98
24,	.....	.....	4.30	5.30	3.70	2.38	2.06	3.60	2.00
25,	.....	.....	4.70	4.90	3.60	2.32	2.04	3.50	1.98
26,	.....	.....	10.10	5.40	3.45	2.31	2.04	3.40	2.03
27,	.....	.....	14.30	6.00	3.70	2.29	2.04	3.10	2.02
28,	.....	.....	16.00	5.40	5.10	2.28	2.06	2.90	2.00
29,	.....	.....	15.50	5.00	4.30	2.32	2.06	2.70	1.95
30,	11.80	.....	11.40	5.00	3.80	2.42	2.04	2.90	1.96
31,	10.50	.....	11.20	.....	3.45	.....	2.05	2.95	.....

SUSQUEHANNA BASIN—STATION NO. 4.

NORTH BRANCH SUSQUEHANNA RIVER AT TOWANDA, PA.

DESCRIPTION OF STATION.

LOCATION—On four span, steel, through- truss, highway bridge at Towanda, Bradford County.

RECORDS AVAILABLE—Discharge measurements and gage heights from January 29, 1914, to September 30, 1914.

DRAINAGE AREA—7,770 square miles.

GAGE—A ½″ x 12″ iron staff gage is laid in concrete facing and attached to the first pier. The elevation of zero is 734.7 feet. Bench Mark No. 1 is under side of southerly window sill at northerly end of Stegmaiers Beer Depot, elevation 29.54 feet above gage datum. Bench Mark No. 2 is top corner of stone work on the brick foundation, north corner of brick building just south of beer depot, elevation 28.88 feet above gage datum. Bench Mark No. 3 is chisled seat on stone door sill south end of west entrance to Stegmairs Beer Depot, 0,25 feet from end of sill, elevation 24.788 feet above gage datum. The gage is read twice daily by Hiram E. Bull.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is end of handrail, right downstream side.

CHANNEL—The channel is straight above and below the station. Both banks are high and not subject to overflow. The bed is composed of rock and gravel.

REMARKS—The U. S. Weather Bureau has obtained gage heights at this station since October 1, 1892.

DISCHARGE MEASUREMENTS OF NORTH BRANCH SUSQUEHANNA RIVER AT TOWANDA, BRADFORD COUNTY, PA.

(Drainage area 7,770 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
2	June 5	Bowen & Taylor,	6[illegible]	3018	1.24	1.89	3739	From upper bridge.
3	Aug. 28	Taylor & Gough,	522	5149	0.82	2.10	4253	From regular bridge.

DAILY MEAN GAGE HEIGHTS OF NORTH BRANCH SUSQUEHANNA RIVER AT TOWANDA, BRADFORD COUNTY, PA.

1914.	JAN.	FEB.	MARCH.	APRIL.	MAY.	JUNE.	JULY.	AUG.	SEPT.
DAY.	G. H.	G. H.	G. H.	G. H.	G. H.	G. H.	G. H.	G. H.	G. H.
1,	*	10.00	3.65	12.65	5.30	2.05	1.98	1.00	2.88
2,	.....	7.43	3.65	12.21	4.82	1.90	1.70	1.00	2.72
3,	.....	6.02	3.58	12.50	4.32	1.78	1.55	0.92	2.73
4,	.....	5.50	3.48	10.50	3.92	1.75	1.38	0.90	3.50
5,	.....	5.75	3.42	8.25	3.78	1.85	1.28	0.85	3.25
6,	.....	4.48	3.42	6.85	8.70	2.00	1.20	0.85	2.78
7,	.....	3.98	3.40	6.12	7.90	1.98	1.20	0.85	2.40
8,	.....	3.65	3.40	9.25	5.80	1.95	1.20	0.85	2.15
9,	.....	2.88	3.40	14.00	5.30	2.35	1.20	0.80	1.98
10,	.....	2.45	3.35	12.28	6.25	2.52	1.35	0.98	1.82
11,	.....	2.38	3.30	10.15	4.90	2.45	2.25	0.90	1.62
12,	.....	*5.00	3.20	8.10	6.00	2.05	2.18	0.90	1.52
13,	.....	4.40	3.20	7.30	‡13.90	1.78	2.60	0.90	1.42
14,	.....	4.40	3.08	6.50	12.20	1.62	2.45	1.22	1.32
15,	.....	4.40	3.00	5.90	8.00	1.45	2.28	1.35	1.22
16,	.....	4.40	3.00	7.73	6.10	1.30	2.15	1.12	1.12
17,	.....	4.40	3.56	8.50	5.10	1.35	1.92	0.95	1.02
18,	.....	4.40	6.63	7.45	4.48	1.22	1.90	0.95	0.98
19,	.....	4.30	4.60	6.60	3.98	1.18	2.22	1.18	0.92
20,	.....	4.30	4.10	7.78	3.70	1.15	2.40	2.60	0.90
21,	.....	4.25	3.72	10.77	3.40	1.10	1.92	3.90	0.88
22,	.....	4.20	3.40	9.75	3.15	1.10	1.58	5.91	0.85
23,	.....	4.20	3.18	8.20	2.95	1.10	1.42	4.60	0.82
24,	.....	4.20	3.02	6.40	2.80	1.10	1.35	3.52	0.82
25,	.....	4.10	3.10	5.40	2.62	1.10	1.30	3.02	0.82
26,	.....	3.88	6.92	5.93	2.50	1.19	1.45	2.78	0.80
27,	.....	3.78	13.30	7.67	2.58	1.08	1.45	2.42	0.86
28,	3.25	3.68	19.08	6.45	3.25	1.15	1.40	2.12	0.86
29,	4.25	.....	†19.90	5.65	2.85	1.05	1.25	2.12	0.85
30,	8.58	.....	16.82	5.50	2.48	2.32	1.05	2.25	0.82
31,	8.83	.....	15 50	.....	2.22	.....	1.00	2.72	.....

*River frozen Jan. 1-29 inclusive; Feb. 12-March 17 inclusive. The observer estimated an average stage of 2.0 for Jan. 1-27 inclusive. †Max. 20.20 at 11 p. m. ‡Max. 14.80 at 7 p. m.

TOWANDA CREEK.

DESCRIPTION OF BASIN.

Towanda Creek, a tributary of the North Branch of the Susquehanna River, rises in the southeastern corner of Tioga County and flows in a general northeasterly direction for 31 miles to its mouth, one mile south of Towanda, Bradford County.

The main creek and its tributaries drain an area of approximately 282 square miles in Tioga, Sullivan and Bradford counties, and flow through narrow valleys, flanked with steep hills, rounded by glacial action. The principal industry is farming, although some lumbering is carried on. The basin is sparsely inhabited, the largest towns being Canton, Alba, New Albany and Monroe boroughs. The principal tributaries are North Branch, Shrader Branch and South Branch.

The mean annual precipitation over this watershed is from 35 to 40 inches.

The discharge has been measured since January 30, 1914, above Monroeton, 5½ miles from the mouth of the creek.

SUSQUEHANNA BASIN—STATION NO. 5.

TOWANDA CREEK AT MONROETON, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, through-truss, steel, highway bridge, at Monroeton, Bradford County.

RECORDS AVAILABLE—Discharge measurements and gage heights from January 30, 1914 to September 30, 1914.

DRAINAGE AREA—218 square miles.

GAGE—A standard chain gage is attached to the downstream side of the bridge. The length of chain from the bottom of the weight to the marker is 23.90 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is on face of the downstream left wingwall about one foot from end, top of second course from bottom or fifth course from top, not counting the coping, elevation 10.60 feet above gage datum. The gage is read twice daily by Leon D. Pepper.

Gaging Station on Towanda Creek at Monroeton.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge The initial point for soundings is top face of right abutment.

CHANNEL—The channel above the station is straight for several hundred feet. It is straight below the station for a short distance with an old abandoned dam about 150 feet below the bridge. The right bank is high and steep. The left bank is low but not subject to overflow. The bed is composed of coarse gravel. The thread of the current passes under the bridge at an angle of about 18 degrees.

DISCHARGE MEASUREMENTS OF TOWANDA CREEK AT MONROETON, BRADFORD COUNTY, PA.

(Drainage area 218 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
1	May 16	Wilson,	151	357	1.79	3.25	657	0.6 msmt.
2	May 16	Wilson,	151	360	1.73	3.23	624	0.6 msmt.
3	May 16	Wilson,	151	360	1.71	3.23	615	0.6 msmt.
4	May 16	Wilson,	151	358	1.65	3.23	600	0.6 msmt.
5	May 28	Taylor,	148	242	0.64	2.55	155	0.2 & 0.8 msmt.
6	June 5	Bowen & Taylor,	148	244	0.63	2.60	154	0.6 msmt.
7	Aug. 28	Taylor & Gough,	142	248	0.16	2.27	40	Surf. msmt.

DAILY MEAN GAGE HEIGHTS OF TOWANDA CREEK AT MONROETON, BRADFORD COUNTY, PA.

1914. DAY.	JAN. G. H.	FEB. G. H.	MARCH. G. H.	APRIL. G. H.	MAY. G. H.	JUNE. G. H.	JULY. G. H.	AUG. G. H.	SEPT. G. H.
1,	.....	4.36	2.97	3.74	2.98	2.27	2.17	2.17	2.26
2,	.....	3.56	2.97	4.10	2.82	2.24	2.17	2.18	2.24
3,	.....	3.34	3.09	3.66	2.67	2.24	2.13	2.21	2.22
4,	.....	3.34	3.13	3.32	2.66	2.32	2.13	2.13	2.20
5,	.....	3.24	3.01	3.18	3.04	2.57	2.15	2.11	2.16
6,	.....	2.96	2.94	3.04	4.53	2.40	2.14	2.13	2.15
7,	.....	2.96	2.88	3.06	3.54	2.30	2.28	2.13	2.14
8,	.....	2.84	2.96	4.26	3.20	2.40	2.22	2.44	2.10
9,	.....	2.80	2.83	4.28	4.10	2.40	2.13	2.39	2.12
10,	.....	2.83	2.77	3.81	3.60	2.32	2.09	2.27	2.10
11,	.....	2.67	2.68	3.36	3.36	2.28	2.69	2.33	2.14
12,	.....	*2.72	2.57	3.20	4.73	2.24	2.41	2.29	2.12
13,	.....	2.80	2.61	3.06	§5.45	2.20	2.32	2.27	2.10
14,	.....	2.82	2.61	2.95	3.97	2.19	2.67	2.23	2.10
15,	.....	2.94	2.47	2.90	3.47	2.20	2.67	2.23	2.10
16,	.....	3.00	2.72	4.11	3.19	2.20	2.50	2.24	2.09
17,	.....	2.97	4.09	3.61	2.98	2.14	2.38	2.21	2.06
18,	.....	3.06	3.75	3.41	2.96	2.14	2.30	2.19	2.05
19,	.....	3.00	3.27	3.26	2.81	2.13	2.24	2.21	2.04
20,	.....	3.04	3.12	4.94	2.72	2.20	2.22	2.48	2.04
21,	.....	3.01	2.97	‡4.84	2.64	2.19	2.20	2.93	2.04
22,	.....	3.04	2.92	3.75	2.67	2.16	2.14	2.71	2.03
23,	.....	3.00	2.77	3.39	2.55	2.12	2.14	2.54	2.05
24,	.....	2.99	2.79	3.17	2.47	2.14	2.14	2.42	2.08
25,	.....	3.00	3.49	3.06	2.44	2.14	2.20	2.36	2.08
26,	.....	2.98	4.85	4.36	2.49	2.10	2.24	2.33	2.08
27,	.....	2.93	5.75	3.56	2.59	2.10	2.20	2.29	2.06
28,	.....	2.93	†6.67	3.30	2.54	2.17	2.31	2.25	2.05
29,	.....	.....	4.69	3.16	2.43	2.20	2.31	2.23	2.06
30,	4.50	.....	4.31	3.08	2.35	2.18	2.26	2.34	2.01
31,	5.52	.....	3.93	.....	2.29	.....	2.20	2.32	.....

*Creek frozen Feb. 12-March 17 inclusive. †Max. 7.07 at noon. ‡Max. 5.36 at 5 p. m. §Max. 6.15 at 7 a. m.

WYALUSING CREEK.

DESCRIPTION OF BASIN.

Wyalusing Creek, a tributary of the North Branch of the Susquehanna River, in Susquehanna and Bradford counties, drains approximately 215 square miles. Rising in three branches, the headwaters of which spread over the central and western parts of Susquehanna County, and join near Rushland near the Susquehanna-Bradford county line, it follows a general southwesterly course to its mouth at Wyalusing, Bradford County, a distance of approximately 30 miles. The basin is sparsely populated, the habitations being scattered over the agricultural section and in small villages, the watershed consisting of hilly, farming country, contains little timber except on the hilltops. The principal tributaries are the North, Middle and East Branches, which form its headwaters, and include a number of lakes in their watersheds. This creek lies entirely within the glacial area, the slope being gradual throughout most of its course. Wyalusing Creek is used to a limited extent for power purposes.

The mean annual precipitation over this watershed is from 35 to 40 inches.

The discharge of this stream has been measured since October 28, 1908, at Wyalusing, 2½ miles above the mouth.

SUSQUEHANNA BASIN—STATION NO. 6.

WYALUSING CREEK AT WYALUSING, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, steel, through-truss, highway bridge; first bridge after leaving Wyalusing, Bradford County.

RECORDS AVAILABLE—Discharge complete December 1, 1908, to January 3, 1909, June 1, 1909, to September 30, 1914.

DRAINAGE AREA—214 square miles.

GAGE—A standard chain gage is fastened to the downstream handrail. The length of chain from the bottom of the weight to the marker is 21.73 feet. The elevation of zero is arbitrary. Bench

Mark No. 1 is a projection on stone in bottom course, left abutment, upstream wing; second stone from face of abutment, 1 foot from first vertical joint from face of abutment, elevation 5.512 feet above gage datum. The gage is read once daily by Alton S. Taylor.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is top edge of east abutment.

CHANNEL—The channel is straight above and below the station for 1,000 feet. The right bank is high and not subject to overflow. The left bank is low and water passes around at high stages. The bed is composed of rocks and gravel.

REMARKS—There are several mills on the stream above the bridge which affect the flow during dry weather. Water passes through an abandoned race on the left side of the creek at gage height 2.9 feet.

DISCHARGE MEASUREMENTS OF WYALUSING CREEK AT WYALUSING, BRADFORD COUNTY, PA.

(Drainage area 214 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
32	June 4	Bowen & Taylor, ...	114	127	0.93	0.84	125	0.6 method.
33	Aug. 27	Taylor & Gough, ...	112	92	0.76	0.64	70	Wading msmt. at bridge.

DISCHARGE TABLE FOR WYALUSING CREEK AT WYALUSING, BRADFORD COUNTY, JAN. 1, 1913.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet	Sec. ft.	Feet	Sec. ft.	Feet	Sec. ft.	Feet	Sec. ft.	Feet	Sec. ft.
—.20	2	.10	186	.40	854	.70	2024	.50	3880
—.10	4	.20	220	.50	932	.80	2122	6.00	4480
0.00	6	.30	256	.60	1016	.90	2220	.50	5060
.10	10	.40	296	.70	1100	4.00	2318	7.00	5700
.20	18	.50	340	.80	1186	.10	2416	.50	6360
.30	26	.60	384	.90	1276	.20	2516	8.00	7100
.40	38	.70	432	3.00	1366	.30	2615	.50	7900
.50	52	.80	482	.10	1456	.40	2715	9.00	8760
.60	68	.90	534	.20	1550	.50	2815	10.00	10300
.70	86	2.00	592	.30	1644	.60	2915	11.00	11900
.80	106	.10	652	.40	1738	.70	3015		
.90	130	.20	714	.50	1832	.80	3120		
1.00	156	.30	780	.60	1926	5.00	3335		

Note:—This table is only applicable subsequent to Jan. 1, 1913, and is based on two measurements made in 1913 together with former curve.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF WYALUSING CREEK AT WYALUSING BRADFORD COUNTY, PA.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis	G H	Dis.	G H	Dis.	G H	Dis.
1,	*	150	5.78	4200	.....	125	3.19	1540	1.95	563	0.64	75	0.59	66	0.45	45	0.49	51
2,	.....	150	3.38	1730	.....	125	4.55	2360	1.66	413	0.58	65	0.54	58	0.44	44	0.49	51
3,	.....	150	2.19	708	.....	125	3.66	1980	1.46	322	0.51	54	0.57	63	0.40	38	0.50	52
4,	.....	150	2.19	708	.....	125	2.64	1050	1.33	268	0.58	65	0.50	52	0.40	38	0.67	81
5,	.....	150	2.04	616	.....	125	2.37	832	1.27	245	0.87	123	0.43	42	0.34	31	0.54	58
6,	.....	150	1.47	327	.....	125	2.14	677	2.76	1150	0.89	128	0.60	68	0.34	31	0.41	39
7,	.....	150	1.52	349	.....	125	1.97	575	1.88	524	0.78	102	0.62	72	0.40	38	0.42	41
8,	.....	150	1.31	260	.....	125	3.85	2170	1.66	413	1.96	580	0.53	57	0.37	34	0.41	39
9,	.....	150	*1.95	563	.....	125	5.16	3510	1.72	442	1.21	224	0.57	63	0.30	26	0.40	38
10,	.....	150	*1.80	482	.....	125	3.11	1470	2.08	640	1.05	171	0.48	49	0.30	26	0.37	34
11,	.....	150	1.21	224	.....	125	2.52	949	1.71	437	0.94	140	1.13	196	0.34	31	0.32	28
12,	.....	150	1.38	288	.....	125	2.23	734	2.46	901	0.78	102	0.78	102	0.47	48	0.30	26
13,	.....	150	1.20	220	.....	125	1.93	551	4.73	3050	0.69	84	0.63	73	0.52	55	0.31	27
14,	.....	150	1.07	177	.....	125	1.68	422	3.24	1590	0.60	66	0.59	66	0.45	45	0.27	24
15,	.....	150	*	150	.....	200	1.56	362	2.39	847	0.58	65	0.72	90	0.44	44	0.30	28
16,	.....	150	.....	150	.....	200	3.67	1980	1.91	540	0.56	62	0.69	84	0.45	45	0.20	18
17,	.....	150	.....	150	.....	300	2.80	1190	1.65	408	0.55	60	0.60	68	0.39	37	0.22	20
18,	.....	150	.....	150	.....	500	2.30	780	1.46	318	0.50	52	0.53	57	0.40	38	0.24	21
19,	.....	150	.....	150	.....	500	1.90	534	1.28	249	0.48	49	0.70	86	0.48	49	0.23	20
20,	.....	150	.....	150	.....	500	4.53	2840	1.17	210	0.53	57	0.57	63	1.50	340	0.22	20
21,	.....	150	.....	150	2.54	966	4.33	2640	1.07	177	0.57	63	0.48	49	2.07	624	0.18	16
22,	.....	150	.....	150	2.16	689	2.98	1350	0.97	148	0.50	52	0.44	44	1.80	482	0.23	20
23,	.....	150	.....	150	1.49	333	2.39	847	0.91	133	0.49	51	0.42	41	1.17	210	0.12	12
24,	.....	150	.....	150	1.26	242	1.92	546	0.83	113	0.51	54	0.44	44	0.97	148	0.22	20
25,	.....	150	.....	150	1.20	220	1.69	427	0.77	100	0.45	45	0.50	52	0.84	116	0.20	18
26,	.....	150	.....	150	4.24	2560	3.69	2010	0.70	86	0.40	38	0.42	41	0.70	86	0.19	17
27,	.....	150	.....	150	5.92	4370	3.25	1600	0.97	148	0.38	36	0.48	49	0.64	75	0.20	18
28,	.....	150	.....	150	†7.31	6110	2.5[illegible]	949	1.55	362	0.44	44	0.50	53	0.60	68	0.21	19
29,	.....	150	.....	.....	6.27	3630	2.10	662	0.97	148	0.85	118	0.61	70	0.58	65	0.22	20
30,	6.34	4870	.....	.....	4.02	2340	2.49	924	0.77	100	0.85	118	0.53	57	0.57	63	0.21	19
31,	4.97	3300	.....	.....	3.50	1830	.....	.....	0.66	79	.....	.....	0.47	48	0.60	68	.....	.....

*Creek frozen Jan. 1 to 29 inclusive, and Feb. 15 to March 20 inclusive; slush ice jam Feb. 9 and 10. Discharge estimated from climatological records. †Max. 7.95 at 5 p. m.: 7030 sec. ft.

ESTIMATED MONTHLY DISCHARGE OF WYALUSING CREEK AT WYALUSING, BRADFORD COUNTY.

(Drainage area 214 square miles.)

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	4870	.....	404	1.888	2.17
February,	4200	.....	462	2.159	2.28
March,	7030	.....	876	4.093	4.71
April,	3510	422	1300	6.075	6.77
May,	3050	79	488	2.280	2.62
June,	580	36	98	0.458	0.51
July,	196	41	65	0.304	0.35
August,	634	26	100	0.467	0.53
September,	81	12	30	0.140	0.15

Note:—Creek frozen Jan. 1-29 inclusive; Feb. 15-March 20 inclusive; slush ice jam Feb. 9-10. Discharge estimated from climatological records.

MEHOOPANY CREEK.

DESCRIPTION OF BASIN.

Mehoopany Creek, with a total drainage area of 131 square miles, rises in the southeastern part of Sullivan County at an elevation of 2,400 feet, and flows in a northeasterly direction to its mouth in the North Branch of the Susquehanna River at Mehoopany at an elevation of 604 feet. It is 23 miles long and, from a point near its source, it has a slope of 82 feet per mile for 9 miles and thence, 9 miles farther to its mouth, the slope is 39.5 feet per mile.

The basin is irregularly shaped and is rough and hilly, with swamps and small lakes in the headwaters, while the valleys are narrow and flanked with steep, wooded hills 900 to 1,000 feet high; the basin is sparsely settled, and there are no large towns in the watershed and agriculture is the main industry; the stream is used for water power by several grist mills.

The creek has a number of branches, the largest being North Branch Mehoopany Creek, which has a total length of 15 miles, and a drainage area of 50 square miles.

The mean annual precipitation over this watershed is from 35 to 40 inches.

The discharge has been measured since January 29, 1914, a short distance above its mouth at Mehoopany.

Gaging Station on Mehoopany Creek near Mehoopany.

SUSQUEHANNA BASIN—STATION NO. 7.

MEHOOPANY CREEK NEAR MEHOOPANY, PA.

DESCRIPTION OF STATION.

LOCATION—On second bridge above the mouth of the creek. It is a two span, through-truss, steel, highway bridge.

RECORDS AVAILABLE—Discharge measurements and gage heights from January 29, 1914, to September 30, 1914.

DRAINAGE AREA—129 square miles.

GAGE—A standard chain gage is fastened to the downstream hand rail. The length of chain from the bottom of the weight to the marker is 16.23 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is on top of outside edge of 6 foot stone near end of downstream right wingwall, about 4 feet above the ground and 1.5 feet from end of stone, elevation 8.525 feet above gage datum. The gage is read twice daily by E. Veargason.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is the outside edge of end upright, right end of bridge.

CHANNEL—The channel is straight above and below the station for 300 and 200 feet respectively. The right bank is high and steep. The left bank is low but not subject to overflow. The bed is composed of coarse gravel.

DISCHARGE MEASUREMENTS OF MEHOOPANY CREEK NEAR MEHOOPANY, WYOMING COUNTY, PA.

(Drainage area 129 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
1	May 15	Wilson, ...	96	207	2.37	2.56	490	0.6 msmt.
2	May 15	Wilson, ...	96	214	2.28	2.56	487	0.6 msmt.
3	May 28	Taylor, ...	87	155	1.59	1.86	246	0.2 & 0.8 msmt.
4	May 28	Taylor, ...	87	156	1.52	1.86	237	0.6 msmt.
5	June 4	Bowen & Taylor, ...	76	122	0.57	1.24	69	0.6 msmt.
6	June 24	Wilson, ...	71	84	0.33	1.01	28	0.6 msmt.
7	Aug. 27	Taylor & Gough, ...	70	98	0.27	1.02	36	Wading msmt. under bridge.

DAILY MEAN GAGE HEIGHTS OF MEHOOPANY CREEK NEAR MEHOOPANY, WYOMING COUNTY, PA.

1914. DAY.	JAN. G. H.	FEB. G. H.	MARCH. G. H.	APRIL. G. H.	MAY. G. H.	JUNE. G. H.	JULY. G. H.	AUG. G. H.	SEPT. G. H.
1,	.....	3.69	1.99	2.82	1.84	1.38	1.04	1.28	0.92
2,	.....	3.12	1.97	3.06	1.68	1.26	1.02	1.18	0.92
3,	.....	2.63	1.95	2.77	1.68	1.11	0.92	1.10	1.05
4,	.....	2.52	2.11	2.49	1.81	1.33	0.82	1.06	1.15
5,	.....	2.38	2.27	2.33	2.34	1.68	0.75	1.02	1.08
6,	.....	2.14	2.35	2.17	2.81	1.43	0.73	0.95	0.98
7,	.....	2.12	2.41	2.05	2.46	1.28	0.96	0.85	0.90
8,	.....	1.98	2.11	†3.62	2.26	1.35	1.12	1.15	0.83
9,	.....	1.85	1.91	4.01	2.56	1.32	1.04	1.45	0.72
10,	.....	1.82	1.91	2.83	2.38	1.30	1.50	1.22	0.68
11,	.....	1.75	1.81	2.55	2.48	1.20	1.25	1.12	0.78
12,	.....	*1.75	1.76	2.35	3.08	1.15	0.96	0.98	0.78
13,	.....	2.75	1.77	2.19	3.28	1.10	0.90	0.92	0.62
14,	.....	2.65	2.01	2.05	2.81	1.60	1.05	0.85	0.62
15,	.....	2.62	2.07	2.09	2.41	1.15	1.00	0.97	0.64
16,	.....	2.80	2.94	3.15	2.16	1.55	1.10	0.86	0.59
17,	.....	2.78	6.17	2.71	1.96	1.50	1.35	0.82	0.62
18,	.....	2.75	3.34	2.52	1.81	1.40	1.20	0.80	0.55
19,	.....	2.72	2.41	2.72	1.71	1.30	1.12	1.25	0.52
20,	.....	2.72	2.27	3.75	1.58	1.20	1.25	2.15	0.52
21,	.....	2.75	2.17	3.65	1.50	1.05	1.15	1.52	0.50
22,	.....	2.45	1.91	2.85	1.46	1.04	1.10	1.48	0.51
23,	.....	2.38	1.81	2.75	1.38	1.02	0.99	1.18	0.51
24,	.....	2.38	1.94	2.37	1.34	1.01	1.12	1.22	0.70
25,	.....	2.22	2.29	2.09	1.26	1.02	1.65	1.12	0.75
26,	.....	2.18	3.81	2.97	1.25	1.02	1.52	1.06	0.64
27,	.....	2.20	5.14	2.61	1.70	1.02	1.55	1.01	0.68
28,	.....	2.12	5.63	2.39	1.94	1.12	1.92	0.82	0.65
29,	3.40	.....	3.85	2.31	1.64	1.20	1.65	1.18	0.61
30,	3.56	.....	3.39	2.15	1.54	1.14	1.55	1.14	0.60
31,	4.12	.....	3.01	.....	1.51	.....	1.38	1.00	.....

*Creek frozen Feb. 12-March 17 inclusive. †Max. 5.02 at 5:00 p. m.

Gaging Station on Tunkhannock Creek at Dixon.

TUNKHANNOCK CREEK.

DESCRIPTION OF BASIN.

Tunkhannock Creek, with a total drainage area of 414 square miles, rises in the eastern part of Susquehanna County and flows in a southwesterly course through Susquehanna, Lackawanna and Wyoming counties to its mouth in the North Branch of the Susquehanna River at Tunkhannock. It is 37 miles long; the last 16 miles has a slope of 13.7 feet per mile, while above this section the slope is considerably greater.

The basin is within the glaciated area and is rough and hilly, with many small lakes and swamps. The main valley is narrow and flanked with high, steep hills of sandstone.

The largest towns are Tunkhannock, Nicholson and Factoryville; Lake Carey, a summer resort, is within this basin. Besides farming, the industries of this section are found in the quarries, tanneries and machine shops. The stream is used for the development of electric power at Nicholson and for power by grist mills.

The mean annual precipitation over this watershed is from 35 to 40 inches.

The discharge has been measured since January 28, 1914, at Dixon approximately 4 miles above the mouth.

SUSQUEHANNA BASIN—STATION NO. 8.

TUNKHANNOCK CREEK AT DIXON, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, steel, through-truss, highway bridge at Dixon, Wyoming County.

RECORDS AVAILABLE—Discharge measurements and gage heights from January 28, 1914, to September 30, 1914.

DRAINAGE AREA—393 square miles.

GAGE—A standard chain gage is fastened to the upstream handrail. The length of chain from the bottom of the weight to the marker is 27.06 feet. The elevation of zero is arbitrary. Bench Mark

No. 1 is on end of downstream right wingwall, top of twelfth course below top of wall or fourth course above bottom, elevation 10.33 feet above gage datum. The gage is read twice daily by N. L. Kneller.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is top face of right abutment.

CHANNEL—The channel above the station is straight for a short distance and then curves to the left. Below it is straight for a short distance and then curves to the left. The right bank is steep and high and not subject to overflow. The left bank is low but not subject to overflow. The bed is composed of coarse gravel.

DISCHARGE MEASUREMENTS OF TUNKHANNOCK CREEK AT DIXON, WYOMING COUNTY, PA.

(Drainage area 393 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
1	May 14	Wilson, ...	166	761	2.67	4.22	2034	0.6 msmt.
2	May 16	Wilson, ...	163	574	1.86	3.28	1068	0.6 msmt.
3	May 16	Wilson, ...	163	506	1.92	3.28	972	0.2 & 0.8 msmt.
4	May 27	Taylor, ...	161	563	1.27	2.82	715	0.2 & 0.8 msmt.
5	June 3	Bowen & Taylor, ...	155	361	0.45	1.79	162	0.6 msmt.
6	Aug. 26	Taylor & Gough, ...	155	406	0.33	1.69	134	0.6 msmt.

DAILY MEAN GAGE HEIGHTS OF TUNKHANNOCK CREEK AT DIXON, WYOMING COUNTY, PA.

1914. DAY.	JAN. G. H.	FEB. G. H.	MARCH. G. H.	APRIL. G. H.	MAY. G. H.	JUNE. G. H.	JULY. G. H.	AUG. G. H.	SEPT. G. H.
1,	.....	4.72	.....	4.56	3.23	1.93	1.62	1.75	1.63
2,	.....	3.45	.....	6.06	2.96	1.86	1.69	1.71	1.54
3,	.....	3.26	.....	4.94	2.74	1.76	1.77	1.65	1.92
4,	.....	3.34	.....	4.09	2.60	2.16	1.65	1.54	1.83
5,	.....	3.20	.....	3.87	3.44	2.84	1.54	1.54	1.77
6,	.....	2.74	.....	3.53	4.27	2.25	1.53	1.52	1.63
7,	.....	2.75	.....	3.52	3.34	2.06	1.68	1.49	1.61
8,	.....	2.39	.....	4.84	3.14	2.11	1.87	1.51	1.55
9,	.....	2.13	.....	‡6.28	3.53	2.33	1.71	1.49	1.52
10,	.....	2.24	.....	4.56	3.36	2.29	3.60	1.44	1.49
11,	.....	2.12	.....	4.22	3.09	2.06	3.78	1.46	1.46
12,	.....	1.72	.....	3.73	4.28	1.98	2.57	2.47	1.38
13,	.....	1.93	.....	3.33	5.22	1.86	2.48	1.93	1.41
14,	.....	3.26	.....	3.09	4.20	1.78	2.72	1.84	1.40
15,	.....	*3.15	.....	2.99	3.64	1.66	2.83	1.77	1.39
16,	.....	.....	2.21	3.89	3.33	1.67	3.08	1.67	1.35
17,	.....	.....	3.57	3.58	3.20	1.59	2.60	1.63	1.32
18,	.....	.....	4.23	3.21	2.93	1.58	3.16	1.70	1.34
19,	.....	.....	3.29	3.02	2.66	1.54	2.82	1.89	1.31
20,	.....	.....	3.13	5.35	2.49	1.60	2.47	2.19	1.30
21,	.....	.....	3.24	5.54	2.38	1.54	2.27	2.59	1.29
22,	.....	.....	2.40	4.53	2.26	1.58	2.15	2.42	1.29
23,	.....	.....	2.31	3.84	2.19	1.54	2.32	2.01	1.23
24,	.....	.....	2.31	3.42	2.04	1.52	2.17	1.89	1.25
25,	.....	.....	2.83	3.20	1.99	1.66	2.07	1.81	1.25
26,	.....	.....	5.64	5.68	1.91	1.58	1.90	1.74	1.27
27,	.....	.....	7.25	4.53	1.74	1.55	1.88	1.67	1.30
28,	2.14	.....	†9.57	3.92	2.84	1.65	2.02	1.63	1.27
29,	2.72	.....	6.79	3.56	2.23	1.87	2.12	1.61	1.27
30,	4.25	.....	5.90	3.56	2.08	1.67	1.92	1.83	1.24
31,	4.72	.....	4.93	.....	2.00	.....	1.82	1.81	.....

*Creek frozen Feb. 15 to March 17 inclusive. †Max. 9.99 at 5 p. m. ‡Max. 7.10 at 8 a. m.

BOWMAN CREEK.

DESCRIPTION OF BASIN.

Bowman Creek, a tributary of the North Branch of the Susquehanna River, rises in the northwestern part of Luzerne County in North Mountain, and flows in a general northeasterly direction through Luzerne and Wyoming counties for 24 miles to its mouth, 1½ miles south of Tunkhannock, Wyoming County. The elevation of its source is approximately 2,400 feet above sea level, and at its mouth 575 feet, having an average fall of 76 feet per mile. Its course is through a rough and hilly country within the glaciated area, the hills bordering the main valley being 800 to 1,000 feet high, while the sparsely inhabited basin contains a few small lakes and swampy areas. Its drainage area is approximately 120 square miles, and contains numerous small tributaries, none of which are of considerable size. There are no large towns in this watershed and the only industries are farming and a limited amount of lumbering.

The mean annual precipitation over this watershed is from 35 to 40 inches.

The discharge has been measured since January 28, 1914, at Eatonville, 1½ miles above the mouth of the creek.

SUSQUEHANNA BASIN—STATION NO. 9.

BOWMAN CREEK AT EATONVILLE, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, through-truss, highway bridge, at Eatonville, Wyoming County.

RECORDS AVAILABLE—Discharge measurements and gage heights from January 28, 1914, to September 30, 1914.

DRAINAGE AREA—118 square miles.

GAGE—A standard chain gage is fastened to the downstream side of the bridge. The length of chain from the bottom of the weight to the marker is 25.55 feet. The elevation of zero is arbitrary.

Gaging Station on Bowman Creek at Eatonville.

Bench Mark No. 1 is on face of left abutment, about 4 feet above the ground, and 1.5 feet downstream from upstream corner, elevation 9.71 feet above gage datum. The gage is read twice daily by Fred I. Wheelock.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is left end of angle iron handrail.

CHANNEL—The channel is straight above and below the station for 200 feet and 1,500 feet respectively. Both banks are high and not subject to overflow. The bed is composed of coarse gravel.

DISCHARGE MEASUREMENTS OF BOWMAN CREEK AT EATONVILLE, WYOMING COUNTY, PA.

(Drainage area 118 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
1	Jan. 28	Hosmer & Brown, ..	86	179	0.91	2.42	162	0.6 msmt.
2	May 14	Wilson, ...	89	288	2.51	3.66	724	Surf. msmt.
3	May 14	Wilson, ...	89	281	2.48	3.66	697	0.6 msmt.
4	May 14	Wilson, ...	89	273	2.40	3.64	656	0.6 msmt.
5	May 27	Taylor, ...	86	176	0.98	2.54	173	0.2 & 0.8 msmt.
6	June 3	Bowen & Taylor, ..	85	146	0.56	2.09	82	0.6 msmt.
7	June 24	Wilson, ...	84	116	0.32	1.80	37	Surf. & 0.6 msmt.
8	Aug. 28	Taylor & Gough, ...	35	30	0.97	1.77	29	Wading above bridge.

DAILY MEAN GAGE HEIGHTS OF BOWMAN CREEK AT EATONVILLE, WYOMING COUNTY, PA.

1914. DAY.	JAN. G. H.	FEB. G. H.	MARCH. G. H.	APRIL. G. H.	MAY. G. H.	JUNE. G. H.	JULY. G. H.	AUG. G. H.	SEPT. G. H.
1,	.....	4.41	.....	3.95	2.51	2.23	1.82	2.00	1.87
2,	.....	3.69	.....	3.97	2.74	2.15	1.85	1.97	1.84
3,	.....	3.31	.....	3.67	2.66	2.10	1.81	1.91	1.90
4,	.....	3.27	.....	3.32	2.56	2.28	1.79	1.86	1.88
5,	.....	3.04	.....	3.12	2.88	2.34	1.78	1.88	1.84
6,	.....	2.87	.....	2.97	3.11	2.21	1.81	1.84	1.80
7,	.....	2.91	.....	2.95	3.01	2.14	1.84	1.82	1.80
8,	.....	2.74	.....	4.57	2.84	2.20	1.88	1.94	1.75
9,	.....	2.64	.....	5.02	3.28	2.16	1.83	2.01	1.78
10,	.....	2.74	2.33	4.27	3.21	2.08	1.89	1.91	1.70
11,	.....	2.49	2 18	3.52	3.26	1.80	1.86	1.80	1.70
12,	.....	2.44	2.30	3.17	3.88	2.00	1.83	1.86	1.70
13,	.....	*2.99	2.38	3.09	4.41	1.96	1.80	1.84	1.70
14,	.....	.....	2.13	4.97	3.68	1.94	1.96	1.82	1.70
15,	.....	.....	2.16	3.47	3.36	1.94	2.15	1.85	1.70
16,	.....	.....	2.43	3.87	3.16	1.88	2.15	1.80	1.67
17,	.....	.....	3.46	3.42	2.96	1.86	2.00	1.78	1.92
18,	.....	.....	3.48	3.22	2.84	1.90	1.92	1.82	1.94
19,	.....	.....	3.23	3.22	2.68	1.84	1.86	2.20	1.88
20,	.....	.....	2.78	3.82	2.60	1.90	1.81	2.18	1.78
21,	.....	.....	2.70	3.92	2.52	1.86	1.80	2.05	1.68
22,	.....	.....	2.63	3.62	2.44	1.88	1.78	1.88	1.66
23,	.....	.....	2.58	3.32	2.38	1.84	1.78	1.80	1.63
24,	.....	.....	2.60	3.12	2.31	1.80	1.82	1.80	1.60
25,	.....	.....	2.98	2.97	2.27	1.80	2.50	1.78	1.69
26,	.....	.....	4.06	4.03	2.21	1.80	2.06	1.77	1.68
27,	.....	.....	5.03	3.62	2.67	1.86	1.95	1.76	1.65
28,	.....	.....	6.48	3.33	2.73	1.98	2.30	1.74	1.64
29,	2.81	.....	5.00	3.22	2.44	1.96	2.30	1.80	1.64
30,	3.08	.....	4.30	3.02	2.35	1.86	2.13	1.98	1.63
31,	4.58	.....	3.96	.....	2.26	.....	2.08	1.95	.....

*Creek frozen Feb. 13-March 18 inclusive, and gage heights not taken by observer from Feb. 14-March 9 inclusive.

LACKAWANNA RIVER.

DESCRIPTION OF BASIN.

Lackawanna River, one of the major tributaries of the North Branch of the Susquehanna River in northeastern Pennsylvania, drains an area of approximately 345 square miles in Susquehanna, Wayne, Lackawanna and Luzerne counties, on the west slope of the Delaware-Susquehanna Divide. Rising in numerous lakes in two branches, one on either side of the central part of the Wayne-Susquehanna county line, which joins a short distance below Union Dale, Susquehanna County, it follows a southerly course through Susquehanna and Wayne counties and thence flows southwest through Lackawanna County to its mouth above Pittston, Luzerne County, a distance of approximately 50 miles. The upper section of this stream to Forest City, Susquehanna County, flows through a rolling, farming country, sparsely populated and largely deforested. From this point the valley widens to approximately six miles in width, bounded on one side by Bald Mountain and on the other by Moosic Mountain, partly covered with second growth timber, the stream flowing through a thickly populated coal mining territory.

The stream is exceedingly rapid, falling from the junction of the two branches (elevation 1,590) at Stillwater to Olyphant, a distance of 23 miles, at the rate of 36 feet per mile; from Olyphant through Scranton to Moosic a distance of 12 miles, at the rate of 10 feet per mile; and from Moosic to its mouth (elevation 526) a distance of four miles, at the rate of 27 feet per mile. It lies entirely within the glacial area. There are many tributaries the largest of which are Spring and Roaring brooks. Scranton, the third largest city in Pennsylvania, and many boroughs are located in this basin. On account of the presence of mine washings, the main stream is not used for water supply purposes, although most of its tributaries are extensively employed. The dry weather flow is maintained above the natural flow of other streams in this section by the drainage of mine water into the stream.

The mean annual precipitation over this watershed is from 35 to 40 inches.

The discharge of this stream was measured from July 1, 1908, to September 16, 1911, and from February 2, 1912, to July 30, 1913, at Scranton, about 8 miles above the mouth, and from August 8, 1913, at Moosic, Lackawanna County.

SUSQUEHANNA BASIN—STATION NO. 10.

LACKAWANNA RIVER AT MOOSIC, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, steel, through-truss, highway bridge at River Street, or Moosic Road, at Moosic, Lackawanna County.

RECORDS AVAILABLE—Discharge measurements and gage heights from August 8, 1913, to September 30, 1914.

DRAINAGE AREA—265 square miles.

GAGE—A standard chain gage is attached to the wooden handrail on the downstream side, near the right bank. The length of chain from the bottom of the weight to the marker is 17.86 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is cross cut on shelf in second stone from end on downstream wingwall of right abutment, twelfth course from top, elevation 6.03 feet above gage datum. The gage is read twice daily by Nelson Ross.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is extreme end of wooden handrail left downstream side.

CHANNEL—The channel is straight for 200 feet above and below the station. Both banks are high, although the right bank may overflow during extreme high stages. The bed is composed of rocks and culm. The current of the stream is at a slight angle with the bridge. There is a good measurable velocity at all stages.

DISCHARGE MEASUREMENTS OF LACKAWANNA RIVER AT MOOSIC, LACKAWANNA COUNTY, PA.

(Drainage area 265 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
4	Mar. 19	Boehringer, ...	114	593	6.20	5.83	3712	Surf msmt.
5	Mar. 23	Boehringer, ...	114	588	6.00	5.65	3525	Surf. msmt.
6	Mar. 29	Boehringer, ...	114	577	6.01	5.59	3468	Surf. msmt.
7	Mar. 30	Boehringer, ...	114	534	5.35	5.23	2858	Surf. msmt.
8	Mar. 30	Boehringer, ...	114	521	5.04	5.06	2611	0.6 msmt.
9	June 6	Hosmer & Wilson, ..	114	214	1.78	2.59	380	0.6 msmt.
10	July 11	Bowen, ...	113	481	3.67	4.31	1766	0.6 msmt.
11	Sept. 21	Taylor & Gough, ...	111	109	0.94	1.88	103	0.6 & Surf. msmt.

DAILY MEAN GAGE HEIGHTS OF LACKAWANNA RIVER AT MOOSIC, LACKAWANNA COUNTY, PA.

1914. DAY.	JAN. G. H.	FEB. G. H.	MARCH. G. H.	APRIL. G. H.	MAY. G. H.	JUNE. G. H.	JULY. G. H.	AUG. G. H.	SEPT. G. H.
1.	2.32	3.93	2.68	4.23	3.15	2.31	2.02	2.32	2.02
2.	2.26	3.45	2.60	4.03	2.99	2.17	2.16	2.28	2.02
3.	2.38	3.28	2.46	4.38	2.87	2.15	2.12	2.43	2.15
4.	2.42	3.23	2.39	3.80	2.79	2.57	2.06	2.54	2.04
5.	2.48	3.23	2.32	3.60	3.19	2.85	2.05	2.33	2.05
6.	2.40	2.97	2.40	3.38	3.53	2.56	2.35	2.09	1.93
7.	2.33	3.06	2.41	3.28	3.38	2.42	2.50	2.07	1.87
8.	2.30	2.93	2.50	3.80	3.05	2.92	2.45	2.18	1.92
9.	2.30	2.70	2.46	4.70	3.15	2.65	2.26	2.03	1.89
10.	2.40	2.63	2.38	3.93	3.01	2.48	†6.29	2.09	1.88
11.	2.33	2.58	2.27	3.63	2.99	2.39	4.62	2.09	1.88
12.	2.28	2.46	2.20	3.60	3.55	2.26	3.48	2.41	1.88
13.	2.27	2.42	2.20	3.37	4.52	2.30	3.02	2.25	1.88
14.	2.28	2.36	2.32	3.13	3.99	2.23	2.76	2.17	1.94
15.	2.22	2.31	2.80	3.13	3.55	2.18	2.73	2.13	1.96
16.	2.23	2.33	2.93	3.43	3.27	2.19	2.69	2.10	1.91
17.	2.29	2.38	3.60	3.46	3.15	2.12	2.55	2.16	1.88
18.	2.26	2.38	3.72	3.26	2.96	2.04	2.70	2.17	1.88
19.	2.22	2.40	3.11	3.06	2.84	2.08	2.65	2.15	1.83
20.	2.20	2.37	2.99	3.50	2.79	2.18	2.50	2.29	1.87
21.	2.32	2.30	2.92	4.18	2.68	2.11	2.30	2.43	1.88
22.	2.26	2.28	2.88	3.78	2.45	2.12	2.30	2.31	1.87
23.	2.23	2.24	2.80	3.46	2.39	2.08	2.44	2.17	1.84
24.	2.42	2.23	2.75	3.28	2.36	2.07	2.31	2.09	1.86
25.	2.62	2.23	2.95	3.08	2.31	2.12	3.35	2.08	1.95
26.	2.49	2.23	4.13	4.38	2.33	2.10	2.82	1.99	1.89
27.	2.48	2.23	5.95	4.13	2.57	2.11	2.64	1.99	1.85
28.	2.68	2.66	*7.85	3.66	2.67	2.30	2.66	2.00	1.86
29.	2.88	.....	5.80	3.40	2.39	2.12	2.82	2.01	1.84
30.	3.68	.....	5.12	3.46	2.35	2.09	2.64	2.15	1.86
31.	4.20	.....	4.25	.....	2.29	.....	2.47	2.12	.....

*Max. 8.00 at 5 p. m. †Max. 8.13 at 8 p. m.

SUSQUEHANNA BASIN—STATION NO. 11.

NORTH BRANCH SUSQUEHANNA RIVER AT WILKES-BARRE, PA.

DESCRIPTION OF STATION.

LOCATION—On four span, steel, through-truss, highway bridge at Market Street, Wilkes-Barre, Luzerne County.

RECORDS AVAILABLE—Discharge complete from March 30, 1899, to September 30, 1914.

DRAINAGE AREA—9,960 square miles.

GAGE—A Mott gage is attached to the handrail on the upstream side of the bridge in the first span from the Wilkes-Barre side. The length of tape is 40.67 feet. The elevation of zero is 505.3 feet above sea level. Bench Mark No. 1 is extreme west end of stone door-sill of north entrance to Coal Exchange Building, elevation 32.99 feet above gage datum. Bench Mark No. 2 is top of rail in front of Lehigh Valley Depot, 39.7 feet above gage datum. Bench Mark No. 3 is top of stone monument at Northampton and River Streets, elevation 30.70 feet above gage datum. The gage is read twice daily by Obediah Hemstreet.

DISCHARGE MEASUREMENTS—Taken from the upstream side of the bridge. The initial point for soundings is end of iron handrail on upstream side at left bank.

CHANNEL—The channel is straight for ¼ mile above and below the station. The right bank is low and overflows at gage height of about 20 feet. The left bank is high, but overflows in extreme high stages. The bed is composed of sand and gravel.

DISCHARGE MEASUREMENTS OF NORTH BRANCH SUSQUEHANNA RIVER AT WILKES-BARRE, LUZERNE COUNTY, PA.

(Drainage area 9,960 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
38	Mar. 31	U. S. Army Eng., ..	1099	21235	6.30	23.09	133766	Taken from Port Bowkley bridge.
39	Apr. 3	Smith & Welles, ...	685	14001	6.82	19.57	95323	Surf. msmt.
40	June 2	Rowen & Taylor, ...	569	3915	1.43	4.35	5581	0.6 msmt.
41	Aug. 25	Taylor & Gough, ...	607	4921	2.13	5.96	10492	0.6 msmt.

DISCHARGE TABLE FOR NORTH BRANCH SUSQUEHANNA RIVER AT WILKES-BARRE, LUZERNE COUNTY, FROM JAN. 1, 1912.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet	Sec. ft.	Feet	Sec. ft.	Feet	Sec. ft.	Feet	Sec. ft.	Feet	Sec. ft.
1.90	820	.30	12560	.70	33020	.10	56340	.50	91070
2.00	845	.40	13000	.80	33520	.20	56980	.60	91990
.10	895	.50	13440	.90	34020	.30	57620	.70	92910
.20	970	.60	13880	11.00	34520	.40	58260	.80	93830
.30	1055	.70	14320	.10	35020	.50	58920	.90	94760
.40	1155	.80	14760	.20	35520	.60	59600	20.00	95700
.50	1270	.90	15200	.30	36020	.70	60280	.10	96650
.60	1395	7.00	15640	.40	36520	.80	60980	.20	97600
.70	1530	.10	16080	.50	37020	.90	61680	.30	98580
.80	1680	.20	16520	.60	37520	16.00	62400	.40	99520
.90	1840	.30	16970	.70	38020	.10	63120	.50	101110
3.00	2005	.40	17420	.80	38520	.20	63850	.60	102300
.10	2185	.50	17870	.90	39020	.30	64590	.70	103510
.20	2380	.60	18320	12.00	39520	.40	65340	.80	104830
.30	2590	.70	18770	.10	40020	.50	66100	.90	106180
.40	2810	.80	19220	.20	40520	.60	66860	21.00	107600
.50	3035	.90	19670	.30	41020	.70	67630	.10	109030
.60	3265	8.00	20120	.40	41520	.80	68410	.20	110480
.70	3500	.10	20590	.50	42020	.90	69200	.30	111950
.80	3750	.20	21060	.60	42520	17.00	70000	.40	113440
.90	4000	.30	21530	.70	43040	.10	70800	.50	114950
4.00	4250	.40	22000	.80	43560	.20	71600	.60	116460
.10	4510	.50	22470	.90	44080	.30	72400	.70	117990
.20	4780	.60	22940	13.00	44600	.40	73200	.80	119540
.30	5070	.70	23410	.10	45120	.50	74000	.90	121110
.40	5380	.80	23880	.20	45640	.60	74800	22.00	122700
.50	5710	.90	24350	.30	46160	.70	75600	.10	124280
.60	6070	9.00	24820	.40	46680	.80	76400	.20	125860
.70	6100	.10	25290	.50	47200	.90	77200	.30	127440
.80	6750	.20	25760	.60	47720	18.00	78000	.40	129020
.90	7100	.30	26230	.70	48240	.10	78810	.50	130600
5.00	7450	.40	26700	.80	48760	.20	79630	.60	132180
.10	7800	.50	27170	.90	49280	.30	80460	.70	133760
.20	8160	.60	27640	14.00	49820	.40	81300	.80	135340
.30	8540	.70	28110	.10	50380	.50	82150	.90	136920
.40	8930	.80	28580	.20	50940	.60	83000	23.00	138500
.50	9320	.90	29050	.30	51500	.70	83860	24.00	154200
.60	9719	10.00	29520	.40	52080	.80	84730	25.00	170000
.70	10100	.10	30020	.50	52660	.90	85610	26.00	186000
.80	10500	.20	30520	.60	53240	19.00	86500	27.00	201500
.90	10900	.30	31020	.70	53840	.10	87400	28.00	217300
6.00	11300	.40	31520	.80	54440	.20	88310	29.00	233000
.10	11710	.50	32020	.90	55060	.30	89230	.50	240850
.20	12120	.60	32520	15.00	55700	.40	90150	30.00	248700

Note:—This table is only applicable subsequent to Jan. 1, 1912, and is based on two discharge measurements made during 1912-1913, together with former curve.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF NORTH BRANCH SUSQUEHANNA RIVER AT WILKES-BARRE, LUZERNE COUNTY, PA.

1914.	JAN.		FEB..		MARCH.		APRIL.		MAY.		JUNE		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	3.96	4150	16.86	68900	.....	4000	‡21.06	108000	9.87	28900	4.65	6220	3.43	3380	3.34	2680	4.80	6750
2,	4.36	5260	15.58	59500	.....	4000	18.82	84900	9.24	27300	4.36	5240	4.23	4870	3.19	2360	5.02	7520
3,	4.24	4900	12.51	42100	.....	4000	19.57	91700	8.51	22500	4.19	4750	3.88	3950	3.13	2240	5.03	7550
4,	4.16	4670	10.71	33100	.....	4000	17.76	76100	7.81	19300	4.19	4750	3.68	3450	3.10	2180	4.79	6720
5,	4.41	5410	10.41	31600	.....	4000	15.43	58500	7.31	17030	4.65	6220	3.52	3090	3.10	2180	5.86	10700
6,	4.24	4900	10.08	29900	.....	4000	12.83	43700	9.81	28600	4.45	5540	3.18	2990	2.96	1940	5.59	9670
7,	4.31	5100	8.46	22300	.....	4000	11.31	36100	14.93	55300	4.46	5580	3.39	2790	2.84	1710	5.07	7700
8,	4.38	5320	7.66	18600	.....	4000	11.11	35100	11.58	37400	4.62	6120	3.37	2740	2.91	1860	4.52	5780
9,	4.36	5260	6.81	14800	.....	4000	19.89	94700	10.02	29600	4.74	6540	3.26	2720	2.94	1910	4.24	4900
10,	4.43	5480	5.96	11100	.....	4000	20.02	95900	10.20	30500	4.88	7030	3.43	2880	3.06	2120	3.97	4180
11,	4.66	6260	5.51	9360	.....	4000	17.22	71800	10.42	31600	4.91	7140	5.51	9360	3.07	2130	3.83	3720
12,	4.86	6960	*	4400	.....	4000	14.98	55600	9.67	28000	4.84	6890	5.16	8020	3.06	2120	3.62	3310
13,	4.51	5740	.....	4400	.....	4000	12.55	42300	15.26	57400	4.42	5450	4.83	6860	3.04	2080	3.50	3040
14,	*	4500	.....	4400	.....	4000	11.67	37900	20.57	102000	4.10	4510	4.86	6960	3.04	2030	3.38	2770
15,	.....	4500	.....	4400	.....	4000	10.63	32700	15.83	61200	3.91	4020	5.20	8160	3.01	2020	3.28	2560
16,	.....	4500	.....	4400	.....	4000	10.98	34400	12.51	42100	3.67	3430	4.98	7380	3.46	2910	3.20	2380
17,	.....	4500	.....	4400	.....	4000	14.16	50700	10.27	30900	3.48	2990	4.78	6680	3.30	2590	3.12	2220
18,	.....	4500	.....	4400	.....	4000	13.25	46500	8.85	24100	3.38	2770	4.34	5190	3.19	2360	3.06	2120
19,	.....	4500	.....	4400	10.51	32100	12.09	40000	7.99	20100	3.33	2660	4.44	5510	2.98	1970	2.94	1910
20,	.....	4500	.....	4400	8.67	23300	12.17	40400	7.29	16900	3.33	2660	4.42	5450	3.48	2990	2.92	1870
21,	.....	4500	.....	4400	7.72	18900	16.61	66200	6.78	14700	3.25	2570	4.64	6120	4.74	6540	2.89	1820
22,	.....	4500	.....	4400	7.25	16700	16.58	66700	6.32	12600	3.26	2510	4.24	4900	7.08	15800	2.86	1780
23,	.....	4500	.....	4400	6.89	15200	14.75	54100	5.91	10300	3.24	2460	3.90	4000	9.02	24900	2.77	1640
24,	.....	4500	.....	4400	6.45	13200	12.55	42300	5.61	9750	3.22	2420	3.74	3600	7.51	17900	2.81	1700
25,	.....	4500	.....	4400	6.45	13200	10.57	32400	5.37	8810	3.23	2440	4.00	4250	6.03	11400	2.80	1680
26,	.....	4500	.....	4400	9.31	28300	10.47	31900	5.17	8050	3.23	2440	3.84	3850	5.40	8930	2.78	1650
27,	.....	4500	.....	4400	18.88	85400	12.36	41300	5.09	7760	3.23	2440	3.72	3650	5.06	7660	2.73	1580
28,	.....	4500	.....	4400	24.68	165000	12.11	40100	5.79	10500	3.22	2420	4.00	4250	4.70	6400	2.71	1540
29,	.....	4500	.....	.....	†28.06	218000	11.02	34600	6.07	11600	3.23	2660	4.14	4620	4.30	5070	2.78	1650
30,	12.23	40700	.....	.....	26.33	191000	10.11	30100	5.43	9050	3.30	2560	3.80	3750	3.96	4150	2.68	1560
31,	14.96	55400	.....	.....	23.39	145000	.....	.....	4.97	7340	.....	.....	3.53	3100	4.23	4870	.....	.....

*The river was frozen or partly frozen from Jan. 14-29 inclusive; Feb. 12-March 18 inclusive, and discharge estimated from North Branch Susquehanna River at Danville. †Max. 28.81 at 9 a. m.; 222000 sec. ft. ‡Max. 22.47 at 1 a. m.; 130000 sec. ft.

ESTIMATED MONTHLY DISCHARGE OF NORTH BRANCH SUSQUEHANNA RIVER AT WILKES-BARRE, LUZERNE COUNTY, PA.

(Drainage area 9,960 square miles).

MONTH.	Discharge in Second feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	55100	.....	7660	0.769	0.887
February,	68900	.....	14900	1.496	1.558
March,	2[illegible]000	.....	33400	3.353	3.866
April,	139000	30100	53900	5.412	6.038
May,	102000	7340	26500	2.661	3.068
June,	7140	2420	4180	0.420	0.469
July,	9360	2720	4770	0.479	0.552
August,	24900	1740	5100	0.512	0.590
September,	10700	1500	3800	0.382	0.426

Note:—The river was frozen or partly frozen from Jan. 14-29 inclusive; Feb. 12-March 18 inclusive, and discharge estimated from North Branch Susquehanna River at Danville.

FISHING CREEK.

DESCRIPTION OF BASIN.

Fishing Creek, with a total drainage area of 378 square miles, is formed in the northeast part of Columbia County by the junction of East and West branches and follows a general southerly and southwesterly course for 30 miles through Columbia County to its mouth in the North Branch of the Susquehanna River at Rupert, below Bloomsburg. From Cole Creek to Huntington Creek, a distance of 11 miles, the slope is 17 feet per mile, while from Huntington Creek to its mouth, 16 miles, the slope is 8.5 feet per mile. The basin lies in a rough and hilly country with a narrow main valley bordered by high, steep hills.

There are a number of tributaries including West Branch, East Branch, Coles, West, Raven, Huntington, Green, Little Fishing and Hemlock creeks and Montour Run. The largest of these tributaries is Huntington Creek, which is 27 miles long and drains an area of 118 square miles in Luzerne and Columbia counties, with some lakes and swamps in the headwaters.

There are several good sized towns in the watershed, including Bloomsburg, the county seat of Columbia County. In addition to farming and lumbering, the industries include tanneries, paper mills,

woolen mills, saw mills, iron foundries and other small manufacturing plants. The stream is polluted by the wastes from the paper mills and tanneries.

Besides being used for water supply at Bloomsburg, the main stream is used for water power by three small hydro-electric plants, paper mills, grist mills and saw mills. Blackberry Run, a small tributary, is used for water supply at Jamison City.

The mean annual precipitation over this watershed is between 35 and 45 inches.

The discharge has been measured since January 27, 1914, at Bloomsburg, a short distance above the mouth.

SUSQUEHANNA BASIN—STATION NO. 12.

FISHING CREEK AT BLOOMSBURG, PA.

DESCRIPTION OF STATION.

LOCATION—On covered wooden, single span, highway bridge, known as Red Rock bridge, at Bloomsburg, Columbia County.

RECORDS AVAILABLE—Discharge measurements and gage heights from January 27, 1914, to September 30, 1914.

DRAINAGE AREA—355 square miles.

GAGE—A standard chain gage is attached to the upstream side of the bridge. The length of chain from the bottom of the weight to the marker is 33.67 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is on the upstream corner of the right abutment, top of thirteenth course below top of abutment or fifth course above bottom, elevation 10.145 feet above gage datum. The gage is read twice daily by L. Norman Cox.

DISCHARGE MEASUREMENTS—Taken from the upstream side of the bridge. The initial point for soundings is top face of right abutment.

CHANNEL—The channel above the station is straight. Below the station it is straight for a short distance and then curves to the right. Both banks are high and not subject to overflow. The bed is composed of sand and gravel.

Gaging Station on Fishing Creek at Red Rock Bridge, Bloomsburg,

DISCHARGE MEASUREMENTS OF FISHING CREEK AT BLOOMSBURG, COLUMBIA COUNTY, PA.

(Drainage area 355 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec	Feet.	Sec. ft.	
1	Jan. 27	Hosmer & Brown, ...	143	390	0.94	3.21	367	0.6 m'mt.
2	June 2	Bowen & Taylor, ...	143	346	0.69	3.06	238	0.6 m'mt.
3	Aug. 25	Taylor & Gough, ...	139	272	0.26	2.61	71	Surf. m'mt.

DAILY MEAN GAGE HEIGHTS OF FISHING CREEK AT BLOOMSBURG, COLUMBIA COUNTY, PA.

1914. DAY.	JAN. G. H.	FEB. G. H.	MARCH. G. H.	APRIL. G. H.	MAY. G. H.	JUNE. G. H.	JULY. G. H.	AUG. G. H.	SEPT. G. H.
1,	.....	6.64	3.26	5.68	4.19	3.15	2.70	2.90	3.06
2,	.....	5.24	3.24	5.82	4.05	3.03	2.73	2.58	2.90
3,	.....	4.65	3.26	5.49	3.85	3.08	2.50	2.60	2.97
4,	.....	4.46	3.32	4.94	3.77	3.09	2.50	2.52	2.89
5,	.....	4.28	3.23	4.65	4.02	3.43	2.63	2.64	2.74
6,	.....	4.04	3.14	4.40	4.57	3.16	2.66	2.42	2.62
7,	.....	4.28	3.21	4.28	4.22	3.04	2.46	2.46	2.66
8,	.....	4.14	3.16	5.03	4.07	3.14	2.70	2.76	2.75
9,	.....	3.62	3.16	‡3.35	4.72	3.04	2.44	3.14	2.71
10,	.....	3.89	3.05	6.07	4.99	3.00	2.48	3.00	2.71
11,	.....	3.66	3.10	5.24	4.67	2.92	2.69	2.96	2.70
12,	.....	3.44	3.27	4.81	6.12	2.88	2.70	3.30	2.66
13,	.....	3.44	3.28	4.53	7.55	2.74	2.55	3.15	2.62
14,	.....	*4.57	3.16	4.23	6.19	2.68	2.67	2.98	2.67
15,	.....	4.59	3.13	4.19	5.80	2.73	2.82	2.92	2.64
16,	.....	4.40	3.91	5.25	4.43	2.69	3.04	2.46	2.59
17,	.....	4.46	5.76	4.90	4.45	2.70	3.03	2.88	2.54
18,	.....	3.98	6.00	4.62	4.12	2.75	3.00	2.56	2.54
19,	.....	3.61	4.88	4.20	4.00	2.78	2.96	2.70	2.60
20,	.....	3.56	4.32	5.93	3.85	2.52	2.81	3.04	2.70
21,	.....	3.46	3.93	6.96	3.73	2.70	2.66	2.90	2.48
22,	.....	3.48	4.05	6.01	3.61	2.53	2.50	2.80	2.50
23,	.....	3.47	4.04	5.22	3.50	2.51	2.51	2.81	2.56
24,	.....	3.32	4.04	4.74	3.41	2.74	2.54	2.65	2.64
25,	.....	3.31	4.78	4.50	3.35	2.72	2.62	2.66	2.43
26,	.....	3.40	6.08	5.83	3.27	2.47	2.70	2.85	2.40
27,	3.25	3.22	7.23	5.67	3.33	2.56	2.62	2.62	2.42
28,	3.24	3.28	†10.23	5.21	3.59	2.74	2.75	2.64	2.33
29,	3.58	.....	10.07	4.77	3.31	3.02	3.34	2.68	2.38
30,	4.29	.....	8.32	4.43	3.23	2.82	3.10	4.05	2.36
31,	5.40	.....	6.28	.....	3.19	.....	2.98	3.34	.....

*Creek frozen Feb. 14-March 12 inclusive. †Max. 10.72 at 5.10 p. m. ‡Max. 9.19 at 6.32 a. m.

SUSQUEHANNA BASIN—STATION NO. 13.

NORTH BRANCH SUSQUEHANNA RIVER AT DANVILLE, PA.

DESCRIPTION OF STATION.

LOCATION—On seven span, steel, through-truss, highway bridge between Danville and South Danville, Montour County, and is about 12 miles above the junction with the West Branch of the Susquehanna River at Northumberland.

RECORDS AVAILABLE—Discharge complete from March 25, 1899, to December 31, 1903, and March 24, 1905, to September 30, 1914.

DRAINAGE AREA—11,300 square miles.

GAGE—A standard chain gage is fastened to the downstream hand-rail on the Danville side. The length of chain from the bottom of the weight to the marker is 44.67 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is extreme south end of stone doorsill at east entrance to City Filtration Plant, elevation 31.70 feet above gage datum. Bench Mark No. 2 is point on face of first course of right abutment, located 0.25 feet from the top of the course, and 2.65 feet from the downstream side of the course, elevation 14.05 feet above gage datum. The gage is read twice daily by E. F. Bell.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is face of right abutment, downstream side.

CHANNEL—The channel is straight above and below the station for one-half mile. The right bank is liable to overflow in extreme high stages. The left bank is high and not subject to overflow. The bed is composed of rocks and gravel.

REMARKS—On March 9, 1904, the bridge and gage were carried away in an ice freshet, and from that date until March 24, 1905, observations were made from temporary gages and were constantly liable to error. For this reason no data is furnished for this period.

DISCHARGE MEASUREMENTS OF NORTH BRANCH SUSQUEHANNA RIVER AT DANVILLE, MONTOUR COUNTY, PA.

(Drainage area 11,300 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
33	June 1	Bowen & Taylor, ...	865	3084	2.51	3.95	7754	0.6 msmt.
34	Aug. 24	Taylor & Gough, ...	1062	5649	3.39	6.68	19149	0.2 & 0.8 msmt.

DISCHARGE TABLE FOR NORTH BRANCH SUSQUEHANNA RIVER AT DANVILLE, MONTOUR COUNTY, FROM JAN. 1, 1912.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet	Sec. ft.	Feet	Sec. ft.	Feet	Sec. ft.	Feet	Sec. ft.	Feet	Sec. ft.
1.60	790	.50	15340	.40	40770	.30	77580	.20	124380
.70	920	.60	15860	.50	41610	.40	78640	.30	125780
.80	1070	.70	16390	.60	42450	.50	79700	.40	127200
.90	1240	.80	16920	.70	43300	.60	80780	.50	128620
2.00	1420	.90	17460	.80	44160	.70	81860	.60	130060
.10	1620	6.00	18000	.90	45030	.80	82940	.70	131500
.20	1830	.10	18540	10.00	45900	.90	84030	.80	132960
.30	2060	.20	19090	.10	46770	14.00	85120	.90	134420
.40	2300	.30	19640	.20	47650	.10	86220	18.00	135900
.50	2560	.40	20200	.30	48530	.20	87320	.10	137380
.60	2840	.50	20770	.40	49420	.30	88440	.20	138880
.70	3140	.60	21340	.50	50310	.40	89560	.30	140380
.80	3460	.70	21920	.60	51200	.50	90680	.40	141880
.90	3780	.80	22510	.70	52090	.60	91820	.50	143400
3.00	4120	.90	23100	.80	52990	.70	92960	.60	144920
.10	4480	7.00	23700	.90	53890	.80	94100	.70	146440
.20	4840	.10	24310	11.00	54800	.90	95260	.80	147960
.30	5220	.20	24980	.10	55720	15.00	96420	.90	149520
.40	5600	.30	25550	.20	56650	.10	97580	19.00	151060
.50	6000	.40	26180	.30	57590	.20	98760	.10	152620
.60	6400	.50	26820	.40	58530	.30	99940	.20	154180
.70	6800	.60	27460	.50	59480	.40	101140	.30	155740
.80	7220	.70	28110	.60	60430	.50	102340	.40	157320
.90	7660	.80	28770	.70	61390	.60	103560	.50	158900
4.00	8100	.90	29430	.80	62360	.78	104780	.60	160480
.10	8550	8.00	30100	.90	63340	.80	106020	.70	162080
.20	9000	.10	30780	12.00	64320	.90	107260	.80	163680
.30	9460	.20	31470	.10	65300	16.00	108520	.90	165280
.40	9920	.30	32180	.20	66280	.10	109780	20.00	166880
.50	10390	.40	32900	.30	67280	.20	111060	.10	168500
.60	10860	.50	33630	.40	68280	.30	112340	.20	170120
.70	11340	.60	34380	.50	69280	.40	113640	.30	171740
.80	11820	.70	35140	.60	70300	.50	114940	.40	173360
.90	12310	.80	35910	.70	71320	.60	116260	.50	175000
5.00	12800	.90	36700	.80	72340	.70	117580	.60	176640
.10	13300	9.00	37500	.90	73380	.80	118920	.70	178280
.20	13800	.10	38310	13.00	74420	.90	120260	.80	179920
.30	14310	.20	39130	.10	75460	17.00	121620	.90	181580
.40	14820	.30	39940	.20	76520	.10	123000	21.00	183240

Note:—The above table is that of the U. S. G. S. and has been adopted by the Water Supply Commission for 1912, 1913 and 1914.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF NORTH BRANCH SUSQUEHANNA RIVER AT DANVILLE, MONTOUR COUNTY, PA.

1914. DAY.	JAN. G H	JAN. Dis.	FEB. G H	FEB. Dis.	MARCH. G H	MARCH. Dis.	APRIL. G H	APRIL. Dis.	MAY. G H	MAY. Dis.	JUNE G H	JUNE Dis.	JULY. G H	JULY. Dis.	AUG. G H	AUG. Dis.	SEPT. G H	SEPT. Dis.
1.	3.68	6720	13.78	82200	.....	4500	17.87	124000	8.29	32100	3.97	7970	2.88	3720	3.08	4410	3.55	6200
2.	3.85	7440	13.30	77600	.....	4500	15.62	104000	7.97	29900	3.78	7140	3.35	5410	3.00	4120	3.95	7880
3.	3.82	7310	10.95	54300	.....	4500	15.42	101000	7.32	25700	3.60	6400	3.48	5920	2.92	3950	4.15	8780
4.	3.85	7440	9.45	41200	.....	4500	15.07	97200	6.67	21700	3.50	6000	3.25	5030	2.82	3520	4.00	8100
5.	4.08	8460	8.60	34400	.....	4500	13.12	76700	6.29	19600	3.58	6320	3.05	4300	2.75	3300	4.02	8190
6.	3.95	7880	8.62	34500	.....	4500	11.22	56800	6.62	21500	3.80	7220	2.92	3850	2.71	3170	4.72	11400
7.	3.82	7310	7.40	26200	.....	4500	9.72	43500	10.62	51400	3.68	6720	2.98	4050	2.63	2930	4.45	10200
8.	3.80	7220	6.70	21900	.....	4500	8.97	37300	10.95	54300	3.68	6720	2.95	3950	§2.65	2990	4.00	8100
9.	3.85	7440	6.05	18300	.....	4500	12.77	72000	9.07	38100	3.80	7220	2.90	3780	§2.67	3050	3.65	6600
10.	3.80	7220	5.55	15600	.....	4500	16.60	116000	8.49	33600	3.82	7310	2.90	3780	2.70	3140	3.45	5800
11.	3.95	7880	4.85	12100	.....	4500	14.95	95800	9.19	39000	3.93	7790	3.80	7220	2.88	3720	3.32	5300
12.	4.15	8780	4.05	8320	.....	4500	12.92	73600	8.57	34200	3.86	7460	4.48	10300	3.00	4120	3.15	4660
13.	3.95	7880	3.50	6000	.....	4500	10.97	54500	10.42	49600	3.90	7660	4.20	9000	2.90	3780	3.07	4370
14.	*	5100	3.45	5800	.....	4500	9.99	45800	16.27	112000	3.58	6320	3.95	7880	2.85	3620	2.98	4050
15.	.....	5100	*	5000	.....	4500	9.12	38500	15.22	99000	3.33	5330	4.08	8460	2.72	3200	2.88	3770
16.	.....	5100	.....	5000	.....	4500	9.02	37700	11.35	58100	3.16	4700	4.32	9550	2.65	2990	2.82	3520
17.	.....	5100	.....	5000	.....	4500	10.67	51800	9.22	39300	3.06	4340	4.12	8640	2.96	3980	2.78	3400
18.	.....	5100	.....	5000	6.17	18900	11.47	59200	7.95	29800	2.93	3880	3.85	7440	2.88	3720	2.71	3170
19.	.....	5100	.....	5000	9.71	43400	10.32	48700	7.07	24100	2.86	3650	3.90	7660	2.78	3400	2.64	2960
20.	.....	5100	.....	5000	8.14	31100	9.77	43900	6.47	20600	2.83	3560	3.65	6600	3.10	4480	2.60	2840
21.	.....	5100	.....	5000	6.89	23000	12.72	71500	5.87	17300	2.88	3720	3.64	6560	3.28	5140	2.58	2780
22.	.....	5100	.....	5000	6.47	20600	14.12	86400	5.47	15200	2.86	3650	3.75	7010	4.08	8460	2.52	2620
23.	.....	5100	.....	5000	6.11	18600	13.02	74600	5.12	13400	2.78	3400	3.50	6000	6.58	21200	2.50	2580
24.	.....	5100	.....	5000	5.79	16900	11.32	57800	4.79	11800	2.78	3400	3.25	5030	6.75	22200	2.50	2560
25.	.....	5100	.....	5000	5.64	16100	9.62	42600	4.47	10200	2.80	3460	3.16	4700	5.68	16300	2.50	2560
26.	.....	5100	.....	5000	6.57	21200	8.97	37300	4.36	9740	2.78	3400	3.45	5800	4.77	11700	2.52	2720
27.	.....	5100	.....	5000	12.39	68200	9.72	43500	4.27	9320	2.78	3400	3.35	5410	4.30	9460	2.50	2560
28.	.....	5100	.....	5000	13.11	138000	10.52	50500	4.37	9780	2.86	3650	3.28	5140	4.05	8320	2.42	2350
29.	.....	5100	.....	.....	‡22.29	‡216000	9.77	43900	4.75	11600	2.90	3780	3.65	6600	3.78	7140	2.40	2300
30.	6.86	22900	.....	.....	22.15	§212000	8.82	36100	4.77	11700	2.83	3720	3.55	6240	3.60	6400	2.40	2300
31.	†11.70	61400	.....	.....	19.69	§62000	.....	.....	4.35	9690	.....	.....	3.26	5070	3.55	6200	.....	.....

*River frozen Jan. 14-29 inclusive; Feb. 15-March 17 inclusive and discharge estimated from climatological records. †Max. 12.30 at 5 p. m.; 67300 sec. ft. §Estimated. ‡Max. 23.0 at 5 p. m.; §232000 sec. ft.

ESTIMATED MONTHLY DISCHARGE OF NORTH BRANCH SUSQUEHANNA RIVER AT DANVILLE, MONTOUR COUNTY.

(Drainage area 11,300 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	67:00	.....	8540	0.756	0.872
February,	82200	.....	18200	1.611	1.678
March,	§23:000	.....	34900	3.088	3.560
April,	134000	36100	64400	5.699	6.356
May,	112000	9320	31100	2.752	3.172
June,	7870	3100	5310	0.470	0.524
July,	10'00	3720	6130	0.542	0.625
August,	22200	2930	6260	0.554	0.639
September,	11400	2300	4820	0.427	0.477

Note:—River frozen Jan. 14-29 inclusive; Feb. 15-March 17 inclusive, and discharge estimated from climatological records.
§Estimated.

CHEST CREEK.

DESCRIPTION OF BASIN.

Chest Creek, an important tributary of the West Branch of the Susquehanna River, rises in the central part of Cambria County, flows 19 miles in a northerly direction to the Cambria-Clearfield county line and passes into and through the latter county in a north-northwesterly direction for 16 miles to its mouth at Mahaffey, Clearfield County. The total length of the stream is 35 miles, and its drainage area comprises 132 square miles.

Rising on the north slope of the Allegheny Mountains, at an elevation of over 2,000 feet, it flows 14 miles through a sparsely inhabited section to a short distance below Patton, Cambria County, where it enters and flows through a narrow valley for four miles to Aldburn, Cambria County. Below Aldburn, it flows for 17 miles, through a valley, more densely populated, to its mouth at Mahaffey, Clearfield County. The total fall of the creek from its source to its mouth is 792 feet, at the rate of 23 feet per mile. There are numerous small tributaries, none of which attain any considerable size.

The creek is bordered on both sides throughout its course by high hills partly timbered, while the most important industries in this valley are the mining of coal, farming and lumbering.

The principal towns in this watershed are Mahaffey, Westover, Hastings and Patton.

The mean annual precipitation over this watershed is from 45 to 50 inches. The discharge of Chest Creek has been measured since October 2, 1913, at St. Lu, 5 miles above the mouth.

SUSQUEHANNA BASIN—STATION NO. 14.

CHEST CREEK AT ST. LU, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, steel, through-truss, highway bridge, at St. Lu, Clearfield County.

RECORDS AVAILABLE—Discharge measurements and gage heights from October 2, 1913, to September 30, 1914.

DRAINAGE AREA—110 square miles.

GAGE—A standard chain gage is attached to the latticed handrail, downstream side. The length of chain from bottom of weight to marker is 19.33 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is a berm on face of left downstream wingwall, fifth course below coping, 1.5 feet from end of wall and 0.3 feet below top of course; elevation 9.66 feet above gage datum. The gage is read twice daily by J. F. Blankenbicker.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge, and by wading at section 50 feet below. The initial point for soundings is left end of handrail.

CHANNEL—The channel is straight for a short distance above, and is straight for 500 feet below the station. The right bank is low and subject to overflow at extreme high stages, while the left bank is high and not subject to overflow. The bed is composed of gravel, and there is good velocity under the bridge at medium and high stages.

REMARKS—There is a low abandoned timber crib dam about 200 feet above the bridge. The head race leads around the bridge on the left, and water may pass through during extreme high stages.

DISCHARGE MEASUREMENTS OF CHEST CREEK AT ST. LU, CLEARFIELD COUNTY, PA.

(Drainage area 110 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
4	June 18	Wilson & Taylor, ...	112	120	0.13	3.52	17	Surf. msmt.
5	Aug. 20	Taylor, ...	67	32	0.56	3.44	18	Wading 50 ft. below bridge.

DAILY MEAN GAGE HEIGHTS OF CHEST CREEK AT ST. LU, CLEARFIELD COUNTY, PA.

1914. DAY.	JAN. G. H.	FEB. G. H.	MARCH. G. H.	APRIL. G. H.	MAY. G. H.	JUNE. G. H.	JULY. G. H.	AUG. G. H.	SEPT. G. H.
1,	3.97	5.97	4.65	4.95	4.24	3.64	4.04	3.60	3.55
2,	3.97	5.67	4.65	5.05	4.14	3.64	4.04	3.55	3.45
3,	3.97	4.97	4.55	4.95	4.04	3.64	3.94	3.70	3.45
4,	3.87	5.87	4.55	4.85	4.04	3.94	3.74	3.50	3.45
5,	3.97	4.67	4.45	4.55	4.24	4.84	3.64	3.45	3.45
6,	3.97	4.57	4.45	4.45	4.84	4.04	3.64	3.45	3.40
7,	3.97	4.57	4.55	4.45	4.44	3.84	3.74	3.70	3.40
8,	4.07	4.37	4.55	4.55	4.54	3.84	3.74	3.50	3.45
9,	4.17	4.37	4.55	4.45	4.44	3.74	3.64	3.45	3.40
10,	4.67	4.37	4.45	4.35	4.34	3.74	3.64	3.50	3.35
11,	4.67	4.27	4.45	4.35	4.24	3.64	3.64	3.55	3.35
12,	4.57	4.27	4.45	4.35	4.24	3.64	3.64	3.65	3.35
13,	4.57	4.17	4.45	4.25	5.24	3.64	3.94	3.70	3.35
14,	4.47	4.27	4.65	4.55	4.84	3.64	3.84	3.65	3.40
15,	4.47	4.37	4.75	5.15	4.64	3.54	3.84	3.50	3.35
16,	4.37	4.27	*8.25	5.15	4.44	3.54	3.64	3.45	3.35
17,	4.47	4.37	6.75	5.05	4.34	3.54	3.64	3.45	3.35
18,	4.37	4.37	5.95	4.85	4.24	3.60	3.84	3.45	3.35
19,	4.27	4.67	5.25	4.75	4.14	3.54	3.74	3.45	3.35
20,	4.47	4.67	4.95	4.95	4.04	3.54	3.74	3.48	3.35
21,	5.07	4.57	4.55	4.65	3.94	3.54	3.64	3.45	3.35
22,	5.07	4.77	4.45	4.55	3.94	4.24	3.64	3.50	3.35
23,	4.97	4.67	4.35	4.45	3.94	4.14	3.54	3.45	3.35
24,	4.97	4.67	4.35	4.35	3.84	3.94	3.54	3.45	3.35
25,	4.97	4.57	4.25	4.45	3.84	3.84	3.54	3.45	3.35
26,	4.97	4.57	5.05	5.25	3.74	3.64	3.44	3.45	3.35
27,	4.87	4.47	5.55	4.75	3.74	3.94	3.64	3.45	3.35
28,	5.07	4.57	6.55	4.55	3.84	4.24	3.64	3.45	3.35
29,	5.87	.....	5.55	4.35	3.84	4.14	3.54	3.46	3.35
30,	6.07	.....	5.55	.....	3.74	4.14	3.54	3.65	3.35
31,	6.47	.....	5.25	.....	3.74	.....	3.44	3.55	.....

*Ice went out.

WEST BRANCH OF SUSQUEHANNA RIVER.

DESCRIPTION OF BASIN.

The West Branch of the Susquehanna River, which joins the North Branch at Northumberland, to form the main Susquehanna River, drains a total area of approximately 6,980 square miles, lying entirely within the state. This branch rises in the west central part of the state, in the northwestern corner of Cambria County, and flows northward a short distance and then turning in a general northeasterly direction, continues to below Renovo, Clinton County, where it takes an easterly course to the mouth of Loyalsock Creek, and thence turns southward to its junction with the North Branch at Northumberland. The total length of this stream, from its headwaters to its mouth is about 226 miles. The West Branch of the Susquehanna River is unique among Pennsylvania rivers, in that it has numerous large tributaries, several of which have basins of 1,000 square miles and over, all of which join the river above Williamsport, which is 41 miles above the mouth.

The headwaters in Cambria and Clearfield counties lie in a rich, bituminous coal mining area, the country being thickly settled and dotted with boroughs and villages. Some farming is carried on in this area, and the mountains are partly covered with second growth timber. From Clearfield to Lock Haven the basin is sparsely settled, little farming being carried on, and the country in general is rough and rugged, the hills being well covered with second growth timber. From Lock Haven to the mouth the drainage basin is well settled along the main stream, and most of the tributaries. Considerable farming is carried on in the valleys, but the mountains are rugged and covered with second growth.

The entire drainage basin is mountainous and rugged, and the river from its headwaters follows a winding course through a narrow channel, hemmed in by the hills and mountains parallel to and west of the Backbone Ridge of the Allegheny Mountains, cutting through the mountains as it turns southward at Halls. The slope of the headwaters is steep the river often falling at the rate of eight feet per mile to Keating, but from this point the slope becomes less steep, falling to the mouth at an average rate of two and one-half feet per mile. Only a small section of the northeastern corner of the basin lies within the glacial area. Extensive limestone areas underlie some of the tributaries which lie to the south of the main stream, and in the Allegheny Mountains.

The principal tributaries are Clearfield, Moshannon, Sinnemahoning, Kettle, Bald Eagle, Pine, Lycoming and Loyalsock creeks.

In this basin are the cities of Williamsport and Lock Haven, many large boroughs and farming and mining villages.

Many domestic water supplies are obtained from the tributaries of the stream, but only a few from the parent stream.

The northern portion of the basin is subject to a mean annual precipitation of 35 to 40 inches, and the southern part from 40 to 45 inches.

The discharge has been measured since October 1, 1913, at Bower, since October 1, 1905, at Renovo, and since March 1, 1895, at Williamsport.

In October, 1913, flood warning stations were also established on the West Branch at Clearfield, Jersey Shore, Lock Haven, and Lewisburg, where daily gage heights are obtained.

SUSQUEHANNA BASIN—STATION NO. 15.

WEST BRANCH SUSQUEHANNA RIVER AT BOWER, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, steel, through-truss, highway bridge about 4 miles below Mahaffey, Clearfield County.

RECORDS AVAILABLE—Discharge complete from October 2, 1913, to September 30, 1914.

DRAINAGE AREA—320 square miles.

GAGE—A standard chain gage is attached to the wooden handrail on the downstream side of the bridge. The length of chain from the bottom of the weight to the marker is 28.71 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is cross cut on face of right downstream concrete wingwall, 13.0 feet down from top of coping and 19.0 feet from end of wall, elevation 12.16 feet above gage datum. The gage is read twice daily by A. T. Bell.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is top face of left abutment.

CHANNEL—The channel above the station curves to the left and then to the right, but is straight under the bridge. Below the station it curves to the right. The right bank is low and is subject to overflow at extreme high stages. The left bank is high. The bed is composed of gravel.

DISCHARGE MEASUREMENTS OF WEST BRANCH SUSQUEHANNA RIVER AT BOWER, CLEARFIELD COUNTY, PA.

(Drainage area 320 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
4	Mar. 31	Brown, ...	124	808	3.46	8.25	2801	Surf. msmt.
5	Mar. 31	Brown, ...	124	806	3.45	8.20	2780	Surf. msmt.
6	Mar. 31	Brown, ...	124	800	3.42	8.16	2733	Surf. msmt.
7	Mar. 31	Brown, ...	124	787	3.40	8.06	2671	Surf. msmt.
8	Mar. 31	Brown, ...	124	783	3.07	8.02	2404	Surf. msmt.
9	Mar. 31	Brown, ...	124	780	3.31	8.00	2590	0.6 & Surf. msmt.
10	Mar. 31	Brown, ...	124	774	3.27	7.94	2529	Surf. msmt.
11	Mar. 31	Brown, ...	124	773	3.25	7.93	2512	Surf. msmt.
12	Apr. 1	Brown, ...	124	727	2.44	7.52	1772	0.6 & Surf. msmt.
13	Apr. 1	Brown, ...	124	721	2.39	7.48	1726	0.6 & Surf. msmt.
14	Apr. 1	Brown, ...	124	726	2.65	7.45	1922	0.6 & Surf. msmt.
15	June 18	Wilson & Taylor, ...	105	306	0.24	4.11	73	Surf. msmt.
16	Aug. 20	Taylor, ...	41	32	1.62	3.98	52	Wading 300' above bridge.

DISCHARGE TABLE FOR WEST BRANCH SUSQUEHANNA RIVER AT BOWER, CLEARFIELD COUNTY, FROM OCT 1, 1913.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
3.60	39	.70	141	.80	508	.90	1283	8.00	2520
.70	42	.80	159	.90	562	7.00	1380	.10	2655
.80	45	.90	180	6.00	619	.10	1480	.20	2795
.90	50	5.00	204	.10	681	.20	1580	.30	2940
4.00	56	.10	231	.20	744	.30	1682	.40	3085
.10	62	.20	258	.30	810	.40	1780	.50	3235
.20	71	.30	288	.40	876	.50	1892	.60	3390
.30	81	.40	324	.50	948	.60	2010	.70	3562
.40	93	.50	366	.60	1026	.70	2130	.80	3720
.50	107	.60	408	.70	1104	.80	2250	.90	3900
.60	122	.70	456	.80	1188	.90	2385	9.00	4080

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF WEST BRANCH SUSQUEHANNA RIVER AT BOWER, CLEARFIELD COUNTY, PA.

1913. DAY.	OCT. G H	OCT. Dis.	NOV. G H	NOV. Dis.	DEC. G H	DEC. Dis.
1.	.....	.....	5.54	383	5.31	292
2.	5.56	391	5.30	288	5.32	295
3.	6.53	971	5.16	247	5.28	282
4.	6.53	971	5.12	236	5.28	282
5.	5.08	226	5.08	226	5.21	261
6.	4.86	172	4.96	194	5.13	239
7.	4.80	159	4.86	172	6.04	644
8.	4.61	125	4.78	155	6.74	1140
9.	4.50	107	7.27	1650	6.29	808
10.	4.42	96	9.20	†4440	6.02	631
11.	4.38	91	7.40	1790	5.90	562
12.	4.42	96	6.72	1120	5.78	498
13.	4.38	91	7.07	1450	5.66	437
14.	4.32	83	7.52	1920	5.54	383
15.	4.26	77	7.16	1540	5.48	358
16.	4.22	73	6.92	1300	5.37	313
17.	4.14	66	6.78	1170	5.26	276
18.	4.18	69	6.32	823	5.12	236
19.	4.23	74	6.06	669	4.98	199
20.	6.50	948	6.04	644	4.82	163
21.	6.05	650	5.72	466	5.04	215
22.	5.52	374	5.56	391	5.04	215
23.	5.30	288	5.44	341	4.96	192
24.	5.47	353	5.36	310	5.12	236
25.	7.06	1440	5.22	264	5.18	253
26.	7.84	2300	5.14	242	4.98	199
27.	7.25	1630	5.08	226	5.26	276
28.	6.56	995	5.05	218	5.34	302
29.	6.13	700	5.40	324	5.24	270
30.	5.86	540	5.35	306	5.10	231
31.	5.78	498	.....	.....	5.16	247

†Estimated.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF WEST BRANCH SUSQUEHANNA RIVER AT BOWER, CLEARFIELD COUNTY, PA.

1914.	JAN.		FEB..		MARCH.		APRIL.		MAY.		JUNE		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1.	4.90	180	9.05	†4200	.....	340	7.47	1860	5.94	585	4.48	104	4.74	148	4.02	57	4.20	71
2.	4.92	185	7.97	2180	.....	340	8.12	2.89	5.68	446	4.46	101	5.12	236	3.97	54	4.08	61
3.	4.98	199	7.11	1190	.....	340	7.58	1990	5.48	358	4.42	96	4.92	185	4.22	73	4.09	61
4.	5.03	209	7.67	2090	.....	340	7.05	1430	5.35	317	4.59	121	4.62	127	4.05	59	4.10	62
5.	5.20	258	7.12	1500	.....	340	6.72	1120	6.20	744	6.28	797	4.44	99	4.01	58	4.00	56
6.	5.20	258	6.59	1020	.....	340	6.41	883	6.92	1300	5.29	385	4.42	96	4.06	60	3.96	54
7.	5.17	250	6.49	941	.....	340	6.46	919	6.26	784	4.85	170	4.40	93	4.34	86	3.85	48
8.	5.20	258	*	530	.....	340	6.50	948	6.09	675	4.73	146	4.32	83	4.45	100	3.84	47
9.	5.32	295	.....	530	.....	340	6.55	987	6.36	850	4.59	121	4.22	73	4.09	61	3.81	46
10.	5.42	332	.....	530	.....	340	6.43	898	5.93	596	4.48	104	4.30	81	4.04	58	3.80	45
11.	5.24	270	.....	530	.....	340	6.24	770	5.78	498	4.45	100	4.16	67	4.10	62	3.78	44
12.	5.16	247	.....	530	.....	340	6.11	687	7.26	1640	4.43	97	4.10	62	4.50	107	3.82	46
13.	*	200	.....	530	.....	340	5.98	608	8.90	3900	4.37	89	4.32	83	4.39	92	3.81	46
14.	.....	200	.....	530	.....	340	5.72	466	7.57	1970	4.30	81	5.04	215	4.42	96	3.80	45
15.	.....	200	.....	530	.....	340	6.16	719	6.90	1280	4.21	72	5.04	215	4.20	71	3.80	45
16.	.....	200	.....	530	.....	1850	8.80	3720	6.41	883	4.13	65	4.84	167	4.08	61	3.76	44
17.	.....	200	.....	530	10.00	1850	7.60	2010	6.04	644	4.07	60	4.55	115	4.08	58	3.76	44
18.	.....	200	.....	530	9.41	1850	7.00	1380	5.78	498	4.10	62	4.84	167	4.02	57	3.74	43
19.	.....	200	.....	530	7.81	2260	6.81	1200	5.53	379	4.08	61	4.97	197	4.01	57	3.96	42
20.	.....	200	.....	530	6.99	1370	6.72	1120	5.38	317	4.10	62	4.55	115	3.96	54	3.64	40
21.	.....	200	.....	530	6.29	803	6.78	1170	5.26	276	4.07	60	4.42	96	3.92	51	3.64	40
22.	.....	200	.....	530	6.18	731	6.39	869	5.14	242	5.37	212	4.20	71	4.18	69	3.69	41
23.	.....	200	.....	530	6.05	650	6.20	744	5.06	220	5.25	273	4.11	63	4.25	76	3.68	41
24.	.....	200	.....	530	6.13	700	5.94	585	4.97	197	4.74	148	4.14	66	4.06	60	3.70	42
25.	.....	200	.....	530	6.28	797	5.96	596	4.86	172	4.58	120	4.11	63	3.98	55	3.70	42
26.	.....	200	.....	530	7.52	1920	8.07	2610	4.49	93	5.06	226	4.08	61	4.03	58	3.75	41
27.	.....	200	.....	530	8.65	3470	7.80	1680	4.36	88	4.74	148	4.06	60	3.94	52	3.74	43
28.	.....	200	.....	530	9.83	†5560	6.78	1170	4.96	194	6.15	712	4.20	71	3.86	48	3.72	43
29.	8.52	3270	.....	.....	8.70	3550	6.48	934	4.42	96	5.50	366	4.34	86	4.18	69	3.74	43
30.	8.20	2800	.....	.....	8.53	3290	6.22	757	4.28	79	4.92	185	4.15	66	4.75	150	3.71	42
31.	9.48	†4920	.....	.....	8.08	2630	.....	.....	4.38	91	.....	.....	4.08	61	4.44	99	.....	.....

*River frozen Jan. 12-28 inclusive, and Feb. 8 to March 16 inclusive; ice gorge on March 17 one mile below. Discharge during frozen period, including March 17 and 18, estimated from climatological records and Bald Eagle Creek at Beech Creek. †Estimated.

ESTIMATED MONTHLY DISCHARGE OF WEST BRANCH SUSQUEHANNA RIVER, AT BOWER CLEARFIELD COUNTY, PA.

(Drainage area 320 square miles).

MONTH.	Discharge in Second feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1913					
October, 2 to 31,	2.00	66	488	1.525	1.70
November,	†1140	155	784	2.450	2.73
December,	1140	163	353	1.103	1.27
a1914.					
January,	†4920	.....	553	1.728	1.99
February,	†4200	.....	888	2.775	2.89
March,	†5550	.....	1240	3.875	4.46
April,	3720	466	1250	3.905	4.35
May,	3900	79	658	2.056	2.37
June,	797	60	178	0.556	0.62
July,	136	60	109	0.341	0.39
August,	156	48	70	0.219	0.25
September,	71	40	47	0.147	0.164

†Estimated.
aRiver frozen Jan. 13-28 inclusive, and Feb. 8-March 16 inclusive, and discharge during frozen period, including March 17 and 18, estimated from climatological records and Bald Eagle Creek at Beech Creek.

SUSQUEHANNA BASIN—STATION NO. 16.

WEST BRANCH SUSQUEHANNA RIVER AT CLEARFIELD, PA.

DESCRIPTION OF STATION.

LOCATION—On two span, steel, through-truss, highway bridge at Clearfield, Clearfield County.

RECORDS AVAILABLE—Gage heights from October 2, 1913, to September 30, 1914. Prior to this gage heights have been obtained since May 1, 1902, by the U. S. Weather Bureau.

DRAINAGE AREA—485 square miles.

GAGE—A staff gage is fastened on the downstream side of the pier. The elevation of zero is 1,094.8 feet above mean sea level. Bench Mark No. 1 is top of rail at P. R. R. Station, elevation 12.2 feet above gage datum. Bench Mark No. 2 is top of rail at N. Y. C. Railroad Station, elevation 10.2 feet above gage datum. The gage is read once daily by H. P. Bridge.

CHANNEL—The channel is straight above and below the station for several hundred feet. Both banks are high and not subject to overflow.

DAILY MEAN GAGE HEIGHTS OF WEST BRANCH SUSQUEHANNA RIVER AT CLEARFIELD, CLEARFIELD COUNTY, PA.

1914. DAY.	JAN. G. H.	FEB. G. H.	MARCH. G. H.	APRIL. G. H.	MAY. G. H.	JUNE. G. H.	JULY. G. H.	AUG. G. H.	SEPT. G. H.
1,	*	5.00	.....	3.35	1.90	1.10	1.05	1.00	0.95
2,	.....	3.65	.....	3.50	1.75	1.00	1.00	1.00	0.80
3,	.....	2.95	.....	3.20	1.60	1.00	1.00	1.00	0.80
4,	.....	3.20	.....	2.80	1.60	1.05	1.00	1.00	0.80
5,	.....	3.10	1.40	2.50	1.70	1.70	0.90	1.00	0.80
6,	.....	2.65	1.40	2.25	2.85	1.45	0.80	1.00	0.80
7,	.....	2.45	1.40	2.35	2.30	1.20	0.80	1.10	0.70
8,	.....	*	1.40	2.35	2.15	1.10	0.70	1.25	0.70
9,	.....	.....	1.40	2.60	2.20	1.10	0.65	1.10	0.70
10,	.....	.....	1.40	2.35	1.95	1.00	0.60	1.00	0.70
11,	.....	.....	1.40	2.15	1.80	0.95	0.50	1.05	0.70
12,	.....	.....	1.40	2.10	2.55	0.90	0.50	1.80	0.70
13,	.....	.....	1.40	2.05	4.34	0.75	0.50	1.25	0.70
14,	.....	.....	1.40	1.80	3.50	0.70	0.70	1.15	0.70
15,	.....	.....	1.70	1.75	2.80	0.60	1.40	1.00	‡0.10
16,	.....	.....	3.60	4.00	2.35	0.55	1.30	1.00	0.10
17,	.....	.....	5.53	3.23	2.05	0.50	1.20	0.95	0.10
18,	.....	.....	4.60	2.70	1.85	0.50	1.20	0.75	0.00
19,	.....	.....	3.50	2.50	1.70	0.50	1.20	0.70	0.00
20,	.....	.....	2.75	2.35	1.55	0.40	1.15	0.70	†0.55
21,	.....	.....	2.35	2.40	1.45	0.40	1.10	0.70	0.60
22,	.....	.....	2.15	2.15	1.40	0.90	1.00	0.70	0.60
23,	.....	.....	1.95	2.05	1.30	1.40	†1.00	0.70	0.60
24,	.....	.....	1.85	1.85	1.25	1.15	1.00	0.65	0.60
25,	.....	.....	1.90	1.75	1.20	1.10	1.00	0.60	0.60
26,	.....	.....	3.15	3.00	1.15	1.05	1.00	0.60	0.60
27,	.....	.....	4.40	3.10	1.10	1.00	1.00	0.55	0.60
28,	.....	.....	5.55	2.60	1.10	1.00	1.00	0.50	0.60
29,	5.00	.....	4.87	2.35	1.10	1.15	1.00	0.65	0.65
30,	4.45	.....	4.00	2.05	1.30	1.15	1.00	1.05	0.70
31,	4.45	.....	3.90	.....	1.20	.....	1.00	1.05	.....

*River frozen Jan. 1-23; Feb. 8-March 16, inclusive; no gage heights taken by observer Jan. 1-23 inclusive; Feb. 8-March 4 inclusive. †Gates up. July 23-Sept 14 inclusive; Sept. 20-30 inclusive. ‡Gates down Sept. 15-19 inclusive.

CLEARFIELD CREEK.

DESCRIPTION OF BASIN.

Clearfield Creek, one of the largest tributaries of the upper West Branch of the Susquehanna River, drains an area of approximately 396 square miles. Rising in the heart of the Allegheny Mountains, at Noel, Clearfield County, the creek flows in a general northeasterly course 18 miles to Frugality, Cambria County, where it turns and follows a northwesterly direction for 11 miles to Irvona, Clearfield County. From Irvona to Madera the creek again flows in a northeasterly direction for 10 miles and then turns, following a tortuous course in a northerly direction for 21 miles to its mouth about 3 miles below Clearfield.

From its headwaters to Coalport, Clearfield County, the main stream passes through a sparsely inhabited region whose hillsides are high and steep and largely deforested, while the only towns in this section are located in the creek valley. From Coalport to Madera the valleys of the creek and its tributaries are more thickly populated, and considerable coal mining is carried on.

After the stream passes Madera, it flows through a narrow, practically uninhabited valley, to its junction with Little Clearfield Creek at Dimeling, below which the valley again widens out to a small extent. Little Clearfield Creek, its principal tributary, parallels the river for 17 miles, draining a mountainous and sparsely inhabited region.

The principal towns in this watershed are Irvona, Coalport and Madera. The fall of the stream is rapid throughout its course and is at the rate of approximately 16 feet per mile.

Clearfield Creek drains the northeast section of Cambria, and the south-central part of Clearfield counties, where the mean annual precipitation is 45 to 50 inches.

The discharge has been measured since October 2, 1913, at Dimeling, 7½ miles above the mouth.

SUSQUEHANNA BASIN—STATION NO. 17.

CLEARFIELD CREEK AT DIMELING, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, steel, through-truss, highway bridge at Dimeling, Clearfield County.

RECORDS AVAILABLE—Discharge measurements and gage heights from October 2, 1913, to September 30, 1914.

DRAINAGE AREA—370 square miles.

GAGE—A standard chain gage is attached to the upstream wooden handrail. The length of chain from the bottom of the weight to the marker is 27.95 feet. The elevation of zero is 1,145.556 feet above sea level. Bench Mark No. 1 is end of upstream wingwall, corner of projecting course at about the ground elevation, elevation 1,163.066 feet above sea level, or 17.51 feet above gage datum. Bench Mark No. 2 is bronze tablet stamped "1172 PITTSBURGH" on northwest capstone of highway bridge, elevation 1,171.876 feet above sea level, or 26.32 feet above gage datum. The gage is read twice daily by G. S. Stover.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is face of left abutment.

CHANNEL—The channel above the station is straight for 100 feet with a reverse curve from left to right. Below the station it is straight for 200 feet then curves to the right. The right bank is low and subject to overflow during extreme high stages. The left bank is high and not subject to overflow. The bed of the creek is composed of gravel, and there is good velocity at all stages.

REMARKS—Little Clearfield Creek enters about 400 feet upstream.

DISCHARGE MEASUREMENTS OF CLEARFIELD CREEK AT DIMELING, CLEARFIELD COUNTY, PA.

(Drainage area 370 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
	1914							
4	Mar. 31	Bronson, ...	143	769	3.99	8.14	3057	Surf. msmt.
5	Mar. 31	Bronson, ...	143	755	3.84	8.05	2899	Surf. msmt.
6	Mar. 31	Bronson, ...	143	783	3.96	8.21	3099	Surf. msmt.
7	Mar. 31	Bronson, ...	143	755	3.79	8.01	2860	Surf. msmt.
8	June 18	Wilson & Taylor, ...	110	188	0.24	3.67	45	0.6 msmt.
9	Aug. 29	Taylor, ...	82	53	1.38	3.56	73	Wading 250' above bridge.
10	Sept. 23	Bowen & Brady, ...	106	154	0.11	3.29	17	Surf. & 0.6 msmt.

DAILY MEAN GAGE HEIGHTS OF CLEARFIELD CREEK AT DIMELING, CLEARFIELD COUNTY, PA.

1914. DAY.	JAN. G. H.	FEB. G. H.	MARCH. G. H.	APRIL. G. H.	MAY. G. H.	JUNE. G. H.	JULY. G. H.	AUG. G. H.	SEPT. G. H.
1,	5.04	9.63	.....	7.39	5.59	4.18	4.14	3.72	3.72
2,	4.90	7.94	.....	7.71	5.41	4.07	4.35	3.72	3.64
3,	5.51	7.17	.....	7.21	5.29	4.09	4.44	3.70	3.64
4,	*	7.24	.....	6.71	5.11	4.13	4.12	3.74	3.60
5,	.....	6.99	.....	6.25	5.15	5.15	3.99	3.73	3.57
6,	.....	6.62	.....	6.03	7.02	4.93	3.91	3.73	3.50
7,	.....	6.31	.....	5.92	6.11	4.69	3.86	4.28	3.40
8,	.....	5.94	.....	5.84	5.81	4.31	3.83	4.08	3.53
9,	.....	5.30	.....	6.47	6.01	4.14	3.80	3.92	3.43
10,	.....	5.42	.....	5.97	5.80	4.08	3.81	3.86	3.32
11,	.....	5.36	.....	5.79	5.52	4.03	3.78	3.76	3.42
12,	.....	*	.....	5.57	6.07	3.95	3.74	3.99	3.44
13,	.....	.....	.....	5.49	7.89	3.95	3.83	4.00	3.37
14,	.....	.....	.....	5.41	7.05	3.96	4.30	3.96	3.40
15,	.....	.....	.....	5.37	6.48	3.85	4.28	3.77	3.46
16,	.....	.....	.....	9.28	6.09	3.83	4.16	3.65	3.44
17,	.....	.....	7.79	7.73	5.75	3.83	4.42	3.62	3.36
18,	.....	.....	8.85	6.94	5.46	3.74	4.50	3.70	3.40
19,	.....	.....	7.45	6.55	5.31	3.74	4.42	3.58	3.40
20,	.....	.....	6.73	6.65	5.15	3.71	4.37	3.55	3.40
21,	.....	.....	6.24	7.04	4.96	3.71	4.34	3.54	3.36
22,	.....	.....	5.99	6.53	4.81	4.18	4.24	3.68	3.28
23,	.....	.....	5.78	6.33	4.71	4.74	4.02	3.66	3.31
24,	7.70	.....	5.57	6.21	4.63	4.33	3.88	3.52	3.28
25,	8.32	.....	5.67	6.05	4.47	4.13	3.84	3.71	3.24
26,	8.20	.....	7.45	6.57	4.36	3.99	3.83	3.60	3.32
27,	7.76	.....	8.71	6.75	4.25	4.01	3.78	3.52	3.27
28,	7.86	.....	9.64	6.35	4.41	5.15	3.82	3.42	3.30
29,	8.12	.....	8.65	6.15	4.35	5.29	3.94	3.64	3.30
30,	9.82	.....	8.45	5.91	4.27	4.43	3.84	3.79	3.36
31,	10.28	.....	8.12	.....	4.22	.....	3.78	3.82	.....

*Creek frozen Jan. 4-23 inclusive; Feb. 12-March 16 inclusive.

MOSHANNON CREEK.

DESCRIPTION OF BASIN.

Moshannon Creek, one of the large tributaries of the West Branch of the Susquehanna River, rises in Blair County, about one mile south of the southwest corner of Centre County. The creek follows a circuitous course, its total length being about 49 miles, with all but the first mile forming the boundary between Clearfield and Centre counties, and has a drainage area of 288 square miles.

The creek flows in a general northeasterly course from its source to Viaduct, after which it follows a northerly direction to its mouth, three miles above Karthaus, Clearfield County. There are many tributaries, both in Centre and Clearfield counties, those rising in the latter county finding their source in the extreme northwestern range of the Allegheny Mountains; the tributaries are all typical mountain streams with rapid falls and variable flows.

Mining is carried on along the Moshannon Creek and its tributaries, and the majority of the latter are polluted with mine waste. On the upper 15 miles of this stream the hills have been deforested for mining purposes, for a distance of from 1 to 2 miles on either side of the creek and are now covered with a second growth. Below Peale, the stream enters a narrow, precipitous valley and flows through a timbered section sparsely populated, with no railroad following its banks. Above Peale, however, the Pennsylvania Railroad and the New York Central and Hudson River Railroad follow the creek.

The most important towns along this creek are Osceola, South Phillipsburg, Phillipsburg, and Houtzdale. The water of the stream and its tributaries is used to some extent for domestic and industrial purposes. Little water power is developed, although on its tributaries there are numerous locations where good power could be obtained.

The mean annual precipitation over this watershed is from 35 inches in the lower portion to 40 inches in the upper part. The discharge of Moshannon Creek has been measured since October 3, 1913, at Winburne, Clearfield County.

SUSQUEHANNA BASIN—STATION NO. 18.

MOSHANNON CREEK AT WINBURNE, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, through-truss, steel highway bridge at Winburne, Clearfield County.

RECORDS AVAILABLE—Discharge measurements and gage heights from October 3, 1913, to September 30, 1914.

DRAINAGE AREA—150 square miles.

GAGE—A standard chain gage is attached to the angle iron handrail. The length of chain from the bottom of the weight to the marker is 17.23 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is corner of fourth course below bridge seat, left downstream wingwall, elevation 6.58 feet above gage datum. The gage is read twice daily by W. M. Hoover.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is left end of handrail.

CHANNEL—The channel is straight above and below the station. The right bank is high. The left bank is low and subject to overflow at times of extreme high water. The bed is composed of gravel.

DISCHARGE MEASUREMENTS OF MOSHANNON CREEK AT WINBURNE, CLEARFIELD COUNTY, PA.

(Drainage area 150 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
6	Mar. 31	Bronson, ...	112	308	3.64	2.84	1121	Surf. msmt.
7	June 19	Wilson & Taylor, ...	95	63	0.94	0.62	59	Wading at bridge.
8	Aug. 21	Taylor, ...	67	40	1.32	0.52	53	0.6 msmt.

DAILY MEAN GAGE HEIGHTS OF MOSHANNON CREEK AT WINBURNE, CLEARFIELD COUNTY, PA.

1914. DAY.	JAN. G. H.	FEB. G. H.	MARCH. G. H.	APRIL. G. H.	MAY. G. H.	JUNE. G. H.	JULY. G. H.	AUG. G. H.	SEPT. G. H.
1,	0.96	3.90	1.57	2.42	1.44	.78	.61	.51	.51
2,	1.09	3.15	1.57	2.46	1.28	.76	.63	.51	.51
3,	1.19	2.61	1.57	2.31	1.22	.74	.61	.51	.51
4,	1.86	2.51	1.47	2.00	1.22	.70	.61	.51	.51
5,	2.46	2.21	1.37	1.83	1.20	.78	.61	.51	.51
6,	2.06	1.88	1.00	1.68	1.58	.86	.60	.51	.51
7,	2.01	1.48	0.99	1.63	1.49	.82	.55	.51	.51
8,	1.86	1.31	0.97	1.64	1.42	.76	.54	.51	.51
9,	1.62	1.48	0.97	1.72	1.61	.74	.52	.51	.51
10,	1.51	1.51	0.94	1.52	1.56	.74	.51	.51	.51
11,	1.56	1.36	0.94	1 46	1.46	.66	.51	.63	.51
12,	1.63	1.02	0.94	1 41	1.64	.66	.53	.67	.51
13,	1.75	0.93	0.95	1.33	2.60	.66	.53	.67	.51
14,	2.01	1.13	0.94	1.28	2.48	.65	.64	.59	.51
15,	2.01	1.06	1.16	1.36	2.21	.64	.67	.54	.49
16,	1.93	1.27	1.73	2.00	1.84	.62	.86	.51	.49
17,	1.62	1.45	2.92	2.18	1.53	.58	.79	.51	.49
18,	1.61	1.51	3.04	1.80	1.48	.58	.74	.51	.47
19,	1.67	1.13	2.48	1.74	1.33	.59	.71	.51	.46
20,	1.45	1.05	2.10	1.97	1.28	.56	.67	.51	.46
21,	1.59	1.42	1.74	2.15	1.18	.76	.61	.51	.46
22,	1.92	1.33	1.58	1.98	1.09	.98	.54	.54	.44
23,	1.98	1.35	1.52	1.83	1.06	.84	.58	.51	.44
24,	1.82	1.25	1.44	1.66	1.04	.70	.51	.51	.44
25,	2.11	*1.56	1.44	1.53	1.01	.62	.51	.51	.44
26,	2.17	1.56	1.69	1.80	1.00	.62	.51	.51	.44
27,	1.91	1.56	2.14	1.78	0.98	.61	.51	.51	.44
28,	1.53	1.56	2.94	1.57	0.96	.96	.51	.51	.44
29,	2.14	.....	2.87	1.52	0.96	.85	.51	.53	.44
30,	3.25	.....	3.00	1.54	0.90	.63	.51	.57	.44
31,	3.76	.....	2.88	.....	0.85	.....	.51	.55	.....

*Creek frozen Feb. 25-March 5 inclusive.

DRIFTWOOD BRANCH OF SINNEMAHONING CREEK.

DESCRIPTION OF BASIN.

The Driftwood Branch of the Sinnemahoning Creek rises in the northeast corner of Elk County on the eastern slope of the Allegheny Mountains, and drains an area of approximately 316 square miles. It flows in a general southeasterly direction through Elk County to the Elk-Cameron county line, from which point it turns in a general easterly direction to Emporium, thence follows a southerly course to its junction with the Bennett Branch at Driftwood, forming the main Sinnemahoning Creek, a total distance of 30 miles. This stream drains the entire northern and central parts of Cameron County as well as a portion of the western section, having many tributaries, the largest of which are West and Clear creeks and the Portage Branch. Since the stream passes through a rough, uninhabited valley throughout most of its course, there are but a few small towns and villages in this watershed, the largest of which is Emporium. The hillsides are covered with second growth timber and industries in this valley have not been developed extensively, although there is some mining and lumbering.

The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge has been measured since September 30th, 1913, at Sterling Run, about 9 miles above the mouth.

SUSQUEHANNA BASIN—STATION NO. 19.

DRIFTWOOD BRANCH SINNEMAHONING CREEK AT STERLING RUN, PA.

DESCRIPTION OF STATION.

LOCATION—On three span, steel, through-truss, highway bridge, about 9 miles above the mouth.

RECORDS AVAILABLE—Discharge measurements and gage heights from September 30, 1913, to September 30, 1914.

DRAINAGE AREA—270 square miles.

GAGE—A standard chain gage is attached to the downstream handrail in the third span. The elevation of zero is arbitrary. The length of chain from the bottom of the weight to the marker is 18.84 feet. Bench Mark No. 1 is a berm cut on the face of the fifth course from top of right downstream wingwall, 0.4 feet from top of course, 0.6 feet from end of wall, elevation 7.15 feet above gage datum. The gage is read twice daily by Thomas Eddy.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge, and by wading at section 50 feet below bridge. The initial point for soundings is face of left abutment.

CHANNEL—The channel is straight for 1,000 feet above and 300 feet below the station. There is a riffle 25 feet above the bridge. Both banks are low and subject to overflow during extreme high stages. The bed consists of gravel. There is good velocity under the bridge at all stages.

REMARKS—Sterling Run enters the creek about 700 feet below the bridge.

DISCHARGE MEASUREMENTS OF DRIFTWOOD BRANCH SINNEMAHONING CREEK AT STERLING RUN, CAMERON COUNTY, PA.

(Drainage area 270 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
4	Mar. 30	Brown, ...	220	671	4.49	3.45	3013	Surf. msmt.
5	Mar. 30	Brown, ...	221	650	4.48	3.40	2912	Surf. msmt.
6	Mar. 30	Brown, ...	221	649	4.48	3.44	2908	Surf. msmt.
7	Mar. 30	Brown, ...	221	671	4.49	3.45	3010	Surf. msmt.
8	June 17	Wilson & Taylor, ...	181	105	0.40	0.85	42	Wading msmt. under bridge.
9	Aug. 19	Taylor & Gough, ...	110	53	0.51	0.68	27	Wading msmt. 75′ below bridge.

DAILY MEAN GAGE HEIGHTS OF DRIFTWOOD BRANCH SINNEMAHONING CREEK AT STERLING RUN, CAMERON CO., PA.

1914. DAY.	JAN. G. H.	FEB. G. H.	MARCH. G. H.	APRIL. G. H.	MAY. G. H.	JUNE. G. H.	JULY. G. H.	AUG. G. H.	SEPT. G. H.
1,	*1.49	3.54	1.46	2.97	2.02	1.28	.94	.58	0.94
2,	1.51	2.88	1.44	3.00	1.88	1.27	.90	.55	1.18
3,	1.51	2.53	1.45	2.86	1.76	1.24	.91	.55	1.23
4,	1.53	2.83	1.47	2.69	1.65	1.23	.89	.56	1.06
5,	1.55	2.78	1.45	2.33	1.90	1.31	.88	.58	0.92
6,	1.53	2.59	1.39	2.05	2.37	1.20	.86	.56	.84
7,	1.55	2.35	1.39	2.14	2.30	1.16	.84	.54	.78
8,	1.57	2.14	1.39	2.79	2.33	1.06	.84	.55	.91
9,	1.59	1.92	1.41	3.43	2.90	1.02	.80	.64	.88
10,	1.60	1.85	1.38	2.88	2.88	1.02	.77	.72	.81
11,	1.55	1.66	1.32	2.46	2.59	1.03	.76	.90	.79
12,	1.53	1.57	1.31	2.34	3.77	.97	.77	.98	.76
13,	1.48	1.55	1.31	2.00	4.59	.95	.79	.98	.73
14,	1.51	1.63	1.27	0.92	3.33	.88	.80	.94	.68
15,	1.52	1.79	1.68	1.87	2.73	.87	.80	.92	.66
16,	1.55	1.85	2.47	2.50	2.18	.86	.82	.88	.66
17,	1.61	1.74	2.59	2.67	1.85	.86	.74	.81	.64
18,	1.67	1.67	2.63	2.51	1.71	.85	.72	.82	.62
19,	1.67	1.69	2.30	2.39	1.64	.84	.72	.71	.60
20,	1.67	1.61	2.08	2.18	1.59	.80	.67	.73	.59
21,	1.68	1.49	1.92	2.07	1.57	.76	.68	.75	.58
22,	1.69	1.47	1.77	1.90	1.51	.82	.66	.74	.56
23,	1.69	1.49	1.67	1.75	1.42	1.02	.64	.74	.56
24,	1.70	*1.49	1.64	1.74	1.33	.96	.61	.90	.60
25,	1.70	1.47	1.68	1.77	1.24	.90	.60	.90	.69
26,	1.69	1.46	2.43	2.41	1.23	.89	.60	.80	.66
27,	1.71	1.47	3.59	2.37	1.31	.89	.60	.79	.64
28,	1.75	1.47	5.19	2.25	1.61	.84	.60	.78	.62
29,	2.27	.....	†5.16	2.16	1.57	.84	.60	1.03	.61
30,	3.11	.....	3.44	2.02	1.40	1.04	.60	1.08	.60
31,	3.35	.....	3.27	.....	1.37	.....	.59	.97	.....

*Creek frozen Jan. 1-4 inclusive and Feb. 24 to March 17 inclusive. †Max. 5.71 at 8.00 a. m.

KETTLE CREEK.

DESCRIPTION OF BASIN.

Kettle Creek, an important tributary of the West Branch of the Susquehanna River, drains an area of approximately 240 square miles. Rising in the southern part of Potter County in many branches which converge near the Potter-Clinton county line, the stream flows in a general southwesterly direction to Leidy, Clinton County, when it turns in a southerly and then southeasterly direction to its mouth at Westport, Clinton County, about 6 miles above Renovo, its total length being approximately 39 miles.

From the headwaters to Cross Forks, Potter County, the creek flows through a rough, uninhabited valley, the bordering hillsides being steep and precipitous. From Cross Forks to a short distance below Leidy, the sparsely inhabited valley widens and some agriculture is carried on. From this point to the mouth the hills converge until the creek passes through a deep, narrow valley for its last 7 miles. The hills in this lower section are high and continuous, the slopes steep and the hillsides covered with second growth timber. The fall of the stream is rapid with numerous riffles and falls throughout its entire length and, above Cross Forks, the main stream is unpolluted.

The creek is not used for domestic water supply and only to a slight degree for water power.

The mean annual precipitation over the watershed is from 35 to 40 inches.

The discharge has been measured since December 2, 1913, at Leidy Clinton County, about 11 miles above the mouth.

SUSQUEHANNA BASIN—STATION NO. 20.

KETTLE CREEK AT LEIDY, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, through-truss, highway bridge, 11 miles above the mouth of the creek.

RECORDS AVAILABLE—Discharge measurements and gage heights from December 2, 1913, to September 30, 1914.

DRAINAGE AREA—202 square miles.

GAGE—A standard chain gage is attached to the handrail on the upstream side of the bridge. The length of chain from the bottom of the weight to the marker is 18.45 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is the outside top corner of the third course below bridge seat, on upstream left wingwall, elevation 11.335 feet above gage datum. The gage is read twice daily by C. W. Sliker.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is left end of lower pipe rail.

CHANNEL—The channel above and below the station is straight for several hundred feet. The right bank is high and steep. The left bank is low with gradual slopes, but not subject to overflow. The bed is composed of clean gravel. There is good velocity at all stages.

DISCHARGE MEASUREMENTS OF KETTLE CREEK AT LEIDY, CLINTON COUNTY, PA.

(Drainage area 202 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
2	June 16	Wilson & Taylor, ...	104	113	0.36	1.79	41	0.6 msmt.
3	Aug. 18	Taylor & Gough, ...	60	35	0.89	1.56	31	Wading 200′ above bridge.

DAILY MEAN GAGE HEIGHTS OF KETTLE CREEK AT LEIDY, CLINTON COUNTY, PA.

1914. DAY.	JAN. G. H.	FEB. G. H.	MARCH. G. H.	APRIL. G. H.	MAY. G. H.	JUNE. G. H.	JULY. G. H.	AUG. G. H.	SEPT. G. H.
1,	2.43	5.08	5.24	4.77	3.03	2.08	1.78	1.56	1.92
2,	2.49	4.31	5.28	4.69	2.91	2.04	1.77	1.53	1.89
3,	2.44	3.85	5.41	4.40	2.85	1.99	1.75	1.73	1.84
4,	2.48	3.82	5.42	4.01	2.66	2.10	1.74	1.77	1.80
5,	2.50	3.90	5.34	3.83	3.01	2.09	1.72	1.73	1.75
6,	2.28	3.76	5.24	3.59	4.05	2.03	1.68	1.69	1.70
7,	2.54	3.68	5.20	3.39	4.07	2.00	1.63	1.65	1.65
8,	2.41	3.47	5.14	3.33	3.89	1.98	1.59	1.56	1.62
9,	2.40	2.91	5.02	5.03	4.37	1.96	1.57	1.71	1.59
10,	2.46	2.88	4.93	4.51	4.73	1.92	1.63	1.69	1.56
11,	2.41	2.77	4.78	3.96	4.33	1.90	1.65	1.69	1.55
12,	2.40	2.38	4.55	3.69	4.56	1.86	1.71	1.67	1.51
13,	*2.46	2.53	4.86	3.41	6.13	1.86	1.71	1.69	1.51
14,	2.50	*6.70	4.95	3.23	5.17	1.84	1.73	1.66	1.51
15,	2.80	6.85	5.40	3.17	4.37	1.83	1.72	1.68	1.49
16,	2.86	6.80	6.05	3.71	3.87	1.81	1.71	1.59	1.48
17,	2.76	6.15	5.28	3.79	3.45	1.80	1.69	1.55	1.47
18,	2.74	6.32	4.04	3.69	3.33	1.78	1.69	1.59	1.45
19,	2.72	6.26	3.72	3.63	3.15	1.76	1.66	1.61	1.46
20,	2.71	6.04	3.35	3.60	2.91	1.74	1.63	1.63	1.43
21,	2.64	5.98	3.08	3.49	2.67	1.73	1.61	1.70	1.43
22,	2.62	5.85	2.92	3.39	2.56	1.82	1.59	1.83	1.42
23,	2.64	5.74	2.81	3.29	2.43	1.84	1.56	1.78	1.41
24,	2.66	5.48	2.74	3.18	2.40	1.84	1.53	1.72	1.73
25,	2.72	5.56	2.75	3.19	2.33	2.04	1.51	1.69	1.69
26,	2.75	5.54	3.40	3.43	2.25	1.94	1.49	1.65	1.65
27,	2.79	5.50	5.32	3.55	2.28	1.82	1.47	1.70	1.61
28,	2.78	5.44	6.90	3.48	2.24	1.76	1.61	1.80	1.58
29,	3.76	.....	6.86	3.31	2.19	1.77	1.61	1.95	1.53
30,	4.36	.....	5.32	3.15	2.17	1.81	1.60	1.99	1.51
31,	4.62	.....	4.95	.....	2.15	.....	1.59	1.97	.....

*Creek frozen Jan. 13-29 inclusive. Feb. 14-Mar. 16 inclusive.

SUSQUEHANNA BASIN—STATION NO. 21.

WEST BRANCH SUSQUEHANNA RIVER AT RENOVO, PA.

DESCRIPTION OF STATION.

LOCATION—On three span, steel, through-truss, highway bridge at Eighth Street, Renovo, Clinton County.

RECORDS AVAILABLE—Discharge complete from January 1, 1908, to September 30, 1914.

DRAINAGE AREA—2,990 square miles.

GAGE—A standard chain gage is fastened to the upstream handrail near the north pier. The length of chain from the bottom of the weight to the marker is 41.13 feet. The elevation of zero is 637.4 feet above sea level. Bench Mark No. 2 is a 1-inch offset in the upstream corner of the north concrete abutment 1 foot above the bottom, with the corner above the projection chiseled out and having an elevation of 8.04 feet above gage datum. Bench Mark No. 3 is a chiseled rod seat on a projection in the eleventh course down from the bridge seat on the southwest end of the stone work of the north abutment, 6 inches below a chiseled arrow head, elevation 10.77 feet above gage datum. The gage is read twice daily by J. Stanley Breen.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. At lowest stages by wading at section 2,000 feet above bridge at foot of Third Street. The initial point for soundings is end of handrail, left downstream side.

CHANNEL—The channel is straight for 1,000 feet above and 3,000 feet below the station. Both banks are high and not subject to overflow. The bed is of rock.

DISCHARGE MEASUREMENTS OF WEST BRANCH SUSQUEHANNA RIVER AT RENOVO, CLINTON COUNTY, PA.

(Drainage area 2,990 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
21	June 15	Wilson & Taylor, ...	333	1614	0.43	0.23	699	0.2 & 0.8 msmt.
22	Aug. 17	Taylor & Gough, ...	150	204	2.21	—0.33	450	Wading 2000' above bridge.

DISCHARGE TABLE FOR WEST BRANCH SUSQUEHANNA RIVER AT RENOVO, CLINTON COUNTY, FROM JAN. 1, 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
—1.10	80	.80	3230	.70	11670	.60	26850	.50	47750
—1.00	100	.90	3420	.80	12060	.70	27500	.60	48600
—0.90	125	2.00	3620	.90	12460	.80	28150	.70	49500
—0.80	155	.10	3820	5.00	12860	.90	28800	.80	50400
—0.70	190	.20	4020	.10	13260	8.00	29450	.90	51300
—0.60	230	.30	4240	.20	13660	.10	30100	11.00	52250
—0.50	280	.40	4460	.30	14100	.20	30750	.10	53200
—0.40	340	.50	4690	.40	14550	.30	31400	.20	54150
—0.30	400	.60	4930	.50	15000	.40	32100	.30	55100
—0.20	470	.70	5180	.60	15500	.50	32800	.40	56050
—0.10	540	.80	5440	.70	16000	.60	33500	.50	57000
0.00	620	.90	5710	.80	16500	.70	34200	.60	58000
.10	700	3.00	5980	.90	17000	.80	34900	.70	59000
.20	790	.10	6260	6.00	17500	.90	35600	.80	60000
.30	890	.20	6540	.10	18000	9.00	36300	.90	61000
.40	1000	.30	6840	.20	18550	.10	37000	12.00	62000
.50	1120	.40	7140	.30	19100	.20	37700	.10	63000
.60	1250	.50	7440	.40	19660	.30	38450	.20	64100
.70	1390	.60	7760	.50	20225	.40	39200	.30	65200
.80	1530	.70	8080	.60	20800	.50	39950	.40	66300
.90	1680	.80	8400	.70	21400	.60	40700	.50	67400
1.00	1830	.90	8740	.80	22000	.70	41450	.60	68600
.10	1990	4.00	9080	.90	22600	.80	42200	.70	69800
.20	2150	.10	9420	7.00	23200	.90	42950	.80	71000
.30	2320	.20	9780	.10	23800	10.00	43700	.90	72200
.40	2490	.30	10140	.20	24400	.10	44450	13.00	73400
.50	2670	.40	10520	.30	25000	.20	45250		
.60	2850	.50	10900	.40	25600	.30	46050		
.70	3040	.60	11280	.50	26200	.40	46900		

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF WEST BRANCH SUSQUEHANNA RIVER AT RENOVO, CLINTON COUNTY, PA.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	*	2700	†8.27	31200	.....	2270	7.21	24500	3.61	7790	1.19	2130	0.85	1600	—0.45	310	0.21	800
2,	.....	2700	7.44	25800	.....	2270	6.90	22600	3.15	6400	0.99	1820	0.43	1040	—0.52	270	0.07	676
3,	.....	2700	7.09	23700	.....	2270	6.63	21000	2.83	5520	0.87	1640	0.33	923	—0.47	298	0.13	727
4,	.....	2700	5.64	15700	.....	2270	5.71	16000	2.54	4790	0.85	1600	0.42	1020	—0.42	328	0.17	703
5,	.....	2700	4.99	12800	.....	2270	4.89	12400	2.53	4760	1.09	1970	0.35	945	—0.41	334	—0.02	604
6,	.....	2700	4.59	11200	.....	2270	4.33	10300	3.98	9010	1.13	2040	0.21	800	—0.51	285	—0.19	477
7,	.....	2700	3.29	6310	.....	2270	4.01	9110	4.69	11300	1.28	2290	0.15	745	—0.53	265	—0.31	394
8,	.....	2700	3.24	6660	.....	2270	4.53	11000	4.09	9890	0.99	1820	—0.01	612	—0.38	352	—0.36	364
9,	.....	2700	3.69	8050	.....	2270	6.25	18800	4.97	12700	0.79	1520	—0.07	564	—0.19	477	—0.41	334
10,	.....	2700	3.74	8210	.....	2270	5.69	16000	5.43	14700	0.61	1260	—0.09	548	—0.09	548	—0.46	304
11,	.....	2700	3.39	7110	.....	2270	4.80	12100	4.83	12200	0.59	1240	—0.14	512	—0.07	564	—0.51	275
12,	.....	2700	3.34	6960	.....	2270	4.39	10500	5.98	17400	0.48	1100	—0.19	477	—0.12	526	—0.57	245
13,	.....	2700	3.24	6660	.....	2270	3.91	8770	9.75	41800	0.31	901	—0.11	538	—0.01	612	—0.62	223
14,	.....	2700	3.24	6660	.....	2270	3.54	7570	8.31	31500	0.26	850	—0.09	548	0.09	692	—0.63	218
15,	.....	2700	3.04	6090	.....	2270	3.29	6810	6.54	20500	0.21	800	—0.09	548	0.01	628	—0.66	206
16,	.....	4050	2.24	4110	.....	2270	4.75	11900	5.25	13900	0.15	745	0.23	820	—0.11	533	—0.69	194
17,	.....	4050	2.09	3800	7.26	24300	6.11	18100	4.39	10500	0.04	652	0.41	1010	—0.26	428	—0.73	180
18,	.....	4050	2.04	3700	7.86	28500	5.37	14400	3.69	8050	0.03	644	0.51	1130	—0.31	394	—0.75	172
19,	.....	4050	*	3120	6.51	20300	4.85	12300	3.22	6600	0.03	644	0.53	1220	—0.39	346	—0.77	166
20,	.....	4050	.....	3120	5.21	13700	4.59	11200	2.89	5680	0.03	644	0.39	989	—0.45	310	—0.79	158
21,	.....	4050	.....	3120	4.25	9960	4.61	11300	2.61	4960	0.03	644	0.23	820	—0.49	286	—0.79	158
22,	.....	4050	.....	3120	3.72	8140	4.43	10600	2.39	4220	0.03	644	0.01	628	—0.43	322	—0.81	152
23,	.....	4050	.....	3120	3.43	7230	4.04	9220	2.11	3840	0.31	901	—0.15	505	—0.35	370	—0.81	152
24,	.....	4050	.....	3120	3.12	6320	3.71	8110	1.91	3440	0.75	1460	—0.21	463	—0.29	407	—0.79	158
25,	.....	4050	.....	3120	2.93	5790	3.49	7410	1.71	3060	0.69	1380	—0.27	421	—0.13	519	—0.74	176
26,	.....	4050	.....	3120	4.15	9600	4.65	11500	1.53	2720	0.46	1070	—0.32	388	—0.13	519	—0.72	183
27,	.....	4050	.....	3120	8.47	32600	5.90	17000	1.47	2620	0.36	956	—0.37	358	—0.27	421	—0.76	169
28,	.....	4050	.....	3120	‡11.78	59600	5.28	13800	1.76	3150	0.33	923	—0.42	328	—0.43	322	—0.77	166
29,	.....	4050	.....	.....	11.25	54600	4.65	11500	1.55	2760	0.65	1320	—0.37	358	—0.27	421	—0.79	158
30,	7.90	28300	.....	.....	8.88	35500	4.06	9280	1.35	2400	1.13	2040	—0.39	346	0.51	1130	—0.81	152
31,	8.18	30600	.....	.....	8.29	31300	.....	.....	1.25	2240	.....	.....	—0.41	334	0.39	989	.....	.....

*River frozen Jan. 1 to 29 inclusive; Feb. 18 to March 16 inclusive, and discharge estimated from West Branch Susquehanna River at Williamsport. †Max. 8.74 at 8 a. m.—34500 sec. ft. ‡Max. 12.54 at 5.15 p. m.—67900 sec. ft.

ESTIMATED MONTHLY DISCHARGE OF WEST BRANCH SUSQUEHANNA RIVER AT RENOVO, CLINTON COUNTY, PA.

(Drainage area 2,990 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	30600	.....	5050	1.689	1.947
February,	34500	.....	8090	2.706	2.818
March,	67900	.....	12400	4.147	4.781
April,	24500	7410	12300	4.281	4.776
May,	41300	2240	9350	3.127	3.606
June,	2290	644	1250	0.418	0.467
July,	1600	328	695	0.232	0.267
August,	1130	270	458	0.153	0.176
September,	800	152	303	0.101	0.113

River frozen Jan. 1st to 29th inclusive; Feb. 19th to March 16th inclusive, and discharge estimated from West Branch Susquehanna River at Williamsport.

BALD EAGLE CREEK.

DESCRIPTION OF BASIN.

Bald Eagle Creek, a large tributary of the West Branch of the Susquehanna River in Centre and Clinton counties, drains an area of approximately 780 square miles and rises on the southern boundary in the western part of Centre County. It flows northeasterly and the valley gradually widens to a considerable breadth as the stream enters Clinton County, continuing to its mouth at Lock Haven, the total length being about 50 miles, and the watershed oval in shape. The valleys in this basin are extensively farmed and contain numerous boroughs and villages, while the bordering ridges are nearly all covered with heavy second growth-timber. This creek rises at an elevation of approximately 1,110 feet and, in a distance of about 23 miles to Milesburg, falls at the rate of 18 feet per mile; from this point to the mouth the fall is approximately five feet per mile. The principal tributaries are Fishing, Beech and Spring creeks. Spring and Fishing creeks enter from the south, draining a limestone section, and their well maintained dry weather flow aids largely in making the discharge of Bald Eagle Creek, in such seasons, a most important affluent of the West Branch. Many of the smaller tributaries are used for domestic water supply, nearly all the boroughs and larger villages being so equipped.

The mean annual precipitation over the greater portion of the watershed is from 40 to 45 inches.

The Water Supply Commission of Pennsylvania maintains three gaging stations in this basin, at Beech Creek Station, at Milesburg, and on Spring Creek near Bellefonte. A gaging station at Castanea, one mile above the mouth, was formerly operated by this Commission but, on account of being influenced by backwater from the West Branch of the Susquehanna River during medium and high stages, was discontinued.

SUSQUEHANNA BASIN—STATION NO. 22.

BALD EAGLE CREEK AT MILESBURG, PA.

DESCRIPTION OF STATION.

LOCATION—On P. R. R. Bridge No. 53 over Bald Eagle Creek, 300 yards above mouth of Spring Creek at Milesburg, Centre County.

RECORDS AVAILABLE—Discharge complete from February 6, 1911, to September 30, 1914.

DRAINAGE AREA—140 square miles.

GAGE—A 10-foot staff gage is fastened to the downstream side of the pier. The elevation of zero is arbitrary. Bench Mark No. 1 is cross "X" on top of fourth step from top of left downstream wingwall, 1.7 feet in from end of step, elevation 6.655 feet above gage datum. The gage is read twice daily by P. H. Haupt.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge, and by wading. The initial point for soundings is face of left abutment under downstream guard rail along tracks of P. R. R.

CHANNEL—The channel above the station is almost straight for 300 feet. Below the station it makes a slight bend toward the northwest. The right bank is high, steep and rocky, while the left bank is low. However, the railroad embankment prevents floods going around the bridge. The bed is composed of gravel and stones.

DISCHARGE MEASUREMENTS OF BALD EAGLE CREEK AT MILESBURG, CENTRE COUNTY, PA.

(Drainage area 140 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
12	June 16	Boehringer & Shade.	58	20	0.65	0.28	13	Wading 250′ upstream.
13	Sept. 1	Bowen & Gough, ...	13	7	0.57	0.05	4	Wading ¼ mi. upstream.

DISCHARGE TABLE FOR BALD EAGLE CREEK AT MILESBURG, CENTRE COUNTY, FROM JAN. 1, 1914.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
—.20	1	.90	75	2.00	375	.10	1110	.20	2580
—.10	2	1.00	88	.10	420	.20	1220	.30	2740
0.00	3	.10	105	.20	470	.30	1340	.40	2900
.10	5	.20	125	.30	515	.40	1460	.50	3060
.20	10	.30	145	.40	580	.50	1590	.60	3220
.30	15	.40	170	.50	640	.60	1720	.70	3390
.40	22	.50	195	.60	700	.70	1850	.80	3560
.50	30	.60	225	.70	770	.80	1990	.90	3730
.60	40	.70	260	.80	840	.90	2130	5.00	3900
.70	50	.80	295	.90	920	4.00	2280		
.80	62	.90	335	3.00	1010	.10	2430		

Note:—This curve is only applicable subsequent to Jan. 1st, 1914, and is based on two discharge measurements made during 1914 together with former curve.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF BALD EAGLE CREEK AT MILESBURG, CENTRE COUNTY, PA.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	1.42	175	3.50	1590	.....	125	2.38	569	1.52	201	.54	34	.29	14	.15	8	.07	4
2,	1.45	182	2.58	688	.....	125	2.34	547	1.34	155	.50	30	.40	22	.13	6	.05	4
3,	1.52	201	2.25	498	.....	125	2.22	481	1.22	129	.50	30	.44	25	.24	12	.05	4
4,	*	150	2.10	420	.....	125	2.00	375	1.16	117	.72	52	.32	16	.18	9	.04	4
5,	.....	150	2.02	384	.....	125	1.78	288	2.50	640	.75	56	.27	14	.16	8	.03	4
6,	.....	150	1.85	315	.....	125	1.61	223	2.72	784	.55	35	.28	14	.15	8	.00	3
7,	.....	150	1.65	242	.....	125	1.60	225	2.24	492	.48	28	.28	14	.15	8	—.04	3
8,	.....	150	1.45	182	.....	125	1.81	299	2.11	425	.44	25	.25	12	.14	7	—.05	2
9,	.....	150	1.40	170	.....	125	2.05	398	2.32	536	.40	22	.22	11	.13	6	—.05	2
10,	.....	150	1.40	170	.....	125	1.79	292	1.95	355	.40	22	.20	10	.13	6	—.05	2
11,	.....	150	*	158	.....	125	1.68	253	1.90	335	.38	21	.19	10	.13	6	—.05	2
12,	.....	150	.....	158	.....	125	1.62	232	3.64	1770	.34	18	.16	8	.13	6	—.05	2
13,	.....	150	.....	158	.....	125	1.45	182	3.02	1030	.30	15	.15	8	.13	6	—.05	2
14,	.....	150	.....	158	.....	125	1.32	150	2.59	694	.30	15	.22	11	.12	6	—.05	2
15,	.....	150	.....	158	.....	125	1.60	225	2.14	440	.30	15	.25	12	.10	5	—.05	2
16,	.....	150	.....	158	3.25	1280	3.16	1180	1.81	299	.29	14	.45	26	.10	5	—.05	2
17,	.....	150	.....	158	3.62	1750	2.50	640	1.59	222	.28	14	1.22	129	.10	5	—.05	2
18,	.....	150	.....	158	3.45	1520	2.14	440	1.44	180	.27	14	.59	39	.08	5	—.05	2
19,	.....	150	.....	158	2.46	616	1.86	319	1.29	143	.27	14	.44	25	.05	4	—.05	2
20,	.....	150	.....	158	2.02	384	2.38	569	1.18	121	.27	14	.32	16	.05	4	—.05	2
21,	.....	150	.....	158	1.81	299	2.34	547	1.08	102	.27	14	.26	12	.05	4	—.07	2
22,	.....	150	.....	158	1.68	253	2.18	460	1.02	91	.56	36	.24	12	.05	4	—.07	2
23,	.....	150	.....	158	1.53	219	1.92	343	0.98	85	.70	50	.18	9	.05	4	—.10	2
24,	.....	150	.....	158	1.50	195	1.65	242	0.92	78	.48	28	.13	6	.03	4	—.10	2
25,	.....	150	.....	158	1.62	232	1.64	239	0.82	65	.42	24	.13	6	.03	4	—.15	2
26,	.....	150	.....	158	2.88	904	2.96	974	0.76	57	.32	16	.13	6	—.02	3	—.15	2
27,	.....	150	.....	158	4.38	2870	2.42	592	0.73	54	.24	12	.13	6	—.04	3	—.15	2
28,	.....	150	.....	158	5.50	4750	2.09	416	0.70	50	.55	35	.38	21	—.06	2	—.15	2
29,	.....	150	.....	.....	3.96	2200	1.86	315	0.68	48	.61	41	.42	24	.18	9	—.15	2
30,	3.48	1560	.....	.....	3.35	1400	1.69	256	0.64	44	.40	22	.20	10	.24	12	—.15	2
31,	†3.72	1880	.....	.....	2.88	904	.....	.....	0.58	38	.....	.....	.16	8	.18	9	.....	.....

*Creek frozen Jan. 4-29 inclusive; Feb. 11-March 15 inclusive, and discharge estimated from Kishacoquillas Creek at Kulps. †Max. 4.00 at 4 p. m.—2280 sec. ft.

ESTIMATED MONTHLY DISCHARGE OF BALD EAGLE CREEK AT MILESBURG, CENTRE COUNTY, PA.

(Drainage area 140 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	2280	.....	255	1.821	2.099
February,	1590	.....	268	1.914	1.993
March,	4750	.....	698	4.986	5.748
April,	1180	150	409	2.921	3.259
May,	1770	38	315	2.250	2.594
June,	56	12	26	0.186	0.208
July,	129	6	18	0.129	0.149
August,	12	2	6	0.043	0.050
September,	4	2	2	0.014	0.015

Creek frozen from Jan. 4th-29th inclusive; Feb. 11th-March 15th inclusive, and discharge estimated from Kishacoquillas Creek at Kulps.

SPRING CREEK.

DESCRIPTION OF BASIN.

Spring Creek, an important tributary of the Bald Eagle Creek, drains an area of approximately 145 square miles, rising in the south central part of Centre County and flowing in a general northerly direction through a rich and thickly inhabited farming section to its mouth at Milesburg, a distance of about 20 miles, the basin being approximately pear shaped. Its course is winding, the slope being rapid at the headwaters and gradually decreasing as the mouth is reached. There are many small tributaries rising in the well timbered mountains but, throughout a stretch of ten miles of this stream from above State College to Bellefonte, no surface tributaries enter it. Throughout this section the valley and surrounding hills are underlain with limestone, sink holes being much in evidence, and the drainage of this part of the watershed appears in numerous limestone springs close to the creek banks, the largest of which is Bellefonte Spring at Bellefonte with a continuous flow of approximately 9,000,000 gallons daily. The dry weather flow of this creek is very large and plays an important part in maintaining the low water flow of Bald Eagle Creek. In this watershed lie State College, Bellefonte, Centre Hall and many large farming villages, nearly all

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF SPRING CREEK NEAR BELLEFONTE, CENTRE COUNTY, PA.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	1.68	216	3.15	841	1.76	236	2.95	716	2.40	451	1.92	282	1.70	221	1.60	198	1.52	180
2,	1.70	221	2.85	658	1.74	231	2.84	710	2.34	427	1.91	279	1.70	221	1.64	207	1.52	180
3,	1.76	236	2.71	586	1.71	224	2.72	591	2.30	411	1.90	276	1.70	221	1.61	200	1.51	178
4,	1.78	241	2.65	558	1.71	224	2.60	536	2.25	394	1.90	276	1.70	221	1.62	203	1.50	176
5,	1.75	234	2.50	491	1.75	234	2.54	509	2.23	404	1.94	283	1.71	224	1.62	203	1.54	185
6,	1.74	231	2.42	459	1.70	221	2.48	483	2.33	443	1.88	270	1.69	219	1.58	194	1.51	178
7,	1.72	226	2.40	451	1.76	236	2.42	459	2.30	411	1.86	264	1.68	216	1.61	178	1.50	176
8,	1.72	226	2.32	419	1.70	221	2.42	459	2.26	397	1.90	276	1.69	219	1.56	187	1.51	178
9,	1.75	234	2.16	362	1.74	231	2.45	471	2.36	435	1.92	282	1.66	212	1.56	187	1.55	187
10,	1.75	234	2.10	341	1.68	216	2.40	451	2.35	431	1.82	252	1.68	216	1.55	187	1.56	189
11,	1.75	234	2.12	348	1.71	224	2.34	427	2.38	443	1.84	258	1.65	210	1.60	198	1.55	187
12,	1.76	236	1.98	300	1.70	221	2.28	404	2.68	572	1.84	258	1.65	210	1.60	198	1.55	187
13,	1.62	203	1.92	282	1.72	226	2.22	383	2.74	601	1.77	238	1.65	210	1.60	198	1.52	180
14,	1.70	221	2.00	306	1.75	234	2.22	383	2.62	545	1.76	236	1.68	216	1.60	198	1.50	176
15,	1.76	236	2.00	306	1.85	261	2.32	419	2.52	500	1.78	241	1.66	212	1.56	189	1.50	176
16,	1.78	241	1.92	282	2.22	383	2.48	483	2.48	483	1.78	241	1.65	210	1.55	187	1.50	176
17,	1.78	241	1.80	246	2.62	545	2.68	572	2.38	443	1.71	224	1.62	208	1.55	187	1.51	178
18,	1.78	241	1.90	276	2.72	591	2.61	540	2.35	431	1.76	236	1.64	207	1.56	189	1.50	176
19,	1.72	226	1.92	282	2.51	496	2.58	527	2.34	427	1.71	224	1.62	203	1.60	198	1.50	176
20,	1.76	236	1.90	276	2.41	455	2.88	675	2.28	404	1.75	234	1.62	208	1.50	176	1.50	176
21,	1.78	241	1.86	264	2.16	362	2.90	686	2.22	383	1.76	236	1.60	198	1.50	176	1.50	176
22,	1.78	241	1.86	264	2.18	369	2.82	642	2.16	362	1.80	246	1.60	198	1.58	194	1.40	156
23,	1.78	241	1.78	241	2.16	362	2.78	621	2.14	355	1.78	241	1.62	208	1.55	187	1.48	172
24,	1.84	258	1.75	234	2.11	344	2.62	545	2.14	355	1.80	246	1.61	200	1.55	187	1.52	180
25,	1.84	258	1.78	241	2.32	419	2.58	527	2.07	330	1.78	241	1.60	198	1.55	187	1.51	178
26,	1.88	270	1.78	241	2.98	734	2.78	621	2.08	334	1.70	221	1.60	198	1.57	191	1.51	178
27,	1.96	294	1.88	270	2.93	734	2.61	540	2.00	306	1.76	236	1.58	194	1.56	189	1.48	172
28,	2.08	334	1.80	246	3.46	1060	2.56	518	2.00	306	1.86	264	1.60	198	1.55	187	1.47	170
29,	2.30	411	.....	.....	3.35	981	2.51	496	2.02	313	1.75	234	1.60	198	1.56	189	1.51	178
30,	2.68	572	.....	.....	3.20	876	2.45	471	1.98	300	1.71	224	1.59	196	1.55	187	1.51	178
31,	2.90	686	.....	.....	3.02	758	.....	.....	1.95	291	.....	.....	1.60	198	1.54	185	.....	.....

Six sec. ft. added to daily discharge for canal.

ESTIMATED MONTHLY DISCHARGE OF SPRING CREEK NEAR BELLEFONTE, CENTRE COUNTY, PA.

(Drainage area 145 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	686	203	272	1.876	2.163
February,	841	234	360	2.483	2.585
March,	1060	216	416	2.869	3.308
April,	716	333	529	3.648	4.070
May,	601	291	409	2.821	3.252
June,	288	221	251	1.731	1.931
July,	224	196	208	1.434	1.653
August,	207	176	191	1.317	1.518
September,	189	156	178	1.228	1.370

SUSQUEHANNA BASIN—STATION NO. 24.

BALD EAGLE CREEK AT BEECH CREEK, PA.

DESCRIPTION OF STATION.

LOCATION—On three span, steel, pony truss, highway bridge at Beech Creek Station, Clinton County.

RECORDS AVAILABLE—Discharge complete from June 23, 1910, to September 30, 1914.

DRAINAGE AREA—565 square miles.

GAGE—A sectional chain gage is attached to the upstream handrail in the fifth panel from the east side of the bridge. The length of chain from the bottom of the weight to the marker is 35.39 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is outer downstream corner of right bridge seat, elevation 19.085 feet above gage datum. The gage is read twice daily by S. C. Mains.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is end of wooden guardrail, downstream side, east end.

CHANNEL—The channel of Bald Eagle Creek above the station is straight for 450 feet, but Beech Creek enters Bald Eagle Creek at right angles from west immediately above the bridge. Below the station the channel is straight for 600 feet. The right bank is about 35 feet above the bed of the creek, while the left bank is about 8 to 10 feet above the bed, which is composed of rock, gravel and mud.

DISCHARGE MEASUREMENTS OF BALD EAGLE CREEK AT BEECH CREEK, CLINTON COUNTY, PA.

(Drainage area 565 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per Sec.	Feet.	Sec. ft.	
10	Mar. 29	Bronson, ...	249	1558	4.42	6.89	6890	Surface msmt.
11	Mar. 29	Bronson, ...	249	1558	4.42	6.89	6890	Surface msmt.
12	Mar. 29	Bronson, ...	248	1482	4.27	6.58	6332	Surface msmt.
13	Mar. 29	Bronson, ...	247	1460	4.16	6.44	6067	Surface msmt.
14	Mar. 29	Bronson, ...	247	1416	4.01	6.32	5676	Surface msmt.
15	Mar. 30	Bronson, ...	228	1207	3.76	5.48	4534	Surface msmt.
16	Mar. 30	Bronson, ...	228	1225	3.75	5.54	4597	Surface msmt.
17	June 16	Boehringer & Shade,	183	427	0.63	1.81	290	0.6 msmt.
18	Sept. 1	Bowen & Gough, ...	159	366	0.46	1.56	167	0.6 msmt.

DISCHARGE TABLE FOR BALD EAGLE CREEK AT BEECH CREEK, CLINTON COUNTY, FROM JAN. 1, 1914.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1.30	100	.50	710	.70	1795	.90	3460	.10	5700
.40	125	.60	780	.80	1910	5.00	3630	.20	5900
.50	150	.70	855	.90	2025	.10	3800	.30	6110
.60	190	.80	930	4.00	2145	.20	3970	.40	6320
.70	235	.90	1010	.10	2265	.30	4150	.50	6530
.80	280	3.00	1100	.20	2395	.40	4330	.60	6740
.90	330	.10	1190	.30	2530	.50	4520	.70	6960
2.00	390	.20	1280	.40	2670	.60	4710	.80	7180
.10	450	.30	1375	.50	2820	.70	4900	.90	7420
.20	510	.40	1470	.60	2970	.80	5100	7.00	7650
.30	570	.50	1575	.70	3130	.90	5300		
.40	640	.60	1685	.80	3290	6.00	5500		

This table is only applicable subsequent to January 1st, 1914, and is based on four discharge measurements made during 1914, together with former curve.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF BALD EAGLE CREEK AT BEECH CREEK, CLINTON COUNTY, PA.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	2.26	546	5.59	4690	.....	600	4.53	2860	3.06	1150	2.07	432	1.74	253	1.62	199	1.58	182
2,	2.23	528	4.57	2920	.....	600	4.56	2910	2.94	1050	2.04	414	1.80	280	‡1.66	217	1.54	166
3,	2.28	558	4.08	2150	.....	600	4.05	2200	‡2.82	946	2.06	426	1.73	271	1.68	236	1.54	166
4,	‡2.30	570	3.88	2000	.....	600	3.67	1760	2.70	855	2.04	414	1.72	244	1.65	212	1.51	154
5,	2.32	584	3.67	1760	.....	600	§3.45	1520	2.96	1060	2.13	468	‡1.70	235	1.64	208	1.54	166
6,	2.29	564	3.41	1480	.....	600	3.23	1310	3.74	1840	2.00	390	1.69	230	1.60	190	‡1.53	162
7,	2.34	598	3.31	1380	.....	600	3.16	1240	3.31	1380	‡1.96	366	1.72	244	1.57	178	1.52	158
8,	2.34	598	§3.05	1140	.....	600	3.33	1400	3.13	1220	1.92	342	1.71	240	1.59	186	1.48	145
9,	2.40	640	2.79	922	.....	600	3.48	1550	4.08	2240	1.90	330	1.72	244	‡1.58	182	1.48	145
10,	2.58	766	2.91	1020	.....	600	3.35	1420	§3.80	1910	1.89	325	1.66	217	1.58	182	1.49	148
11,	‡2.46	682	2.67	832	.....	600	3.26	1340	3.51	1590	1.86	310	1.66	217	1.58	182	1.49	148
12,	2.35	605	2.35	605	.....	600	3.20	1280	5.36	4260	1.86	310	‡1.68	226	1.58	182	1.52	158
13,	2.23	528	2.37	619	.....	600	2.89	1000	5.76	5020	1.81	285	1.70	235	1.66	212	‡1.50	150
14,	2.38	626	2.31	577	.....	600	2.82	946	4.88	3430	‡1.80	280	1.72	244	1.60	190	1.49	148
15,	2.65	818	‡2.52	724	.....	600	2.99	1090	4.16	2840	1.80	280	1.71	240	1.56	174	1.49	148
16,	2.85	970	2.73	878	.....	3000	4.67	3080	3.70	1800	1.78	271	1.71	240	‡1.56	174	1.51	154
17,	2.58	766	3.55	1630	.....	3000	4.02	2170	§3.46	1530	1.76	262	2.04	414	1.56	174	1.50	150
18,	‡2.48	696	3.57	1650	5.09	3780	3.69	1780	3.12	1210	1.75	258	1.82	290	1.56	174	1.48	145
19,	2.38	626	3.58	1660	4.15	2330	§3.70	1800	2.96	1060	1.76	262	‡1.74	253	1.51	154	1.46	140
20,	2.30	570	3.35	1420	3.60	1680	4.03	2180	2.80	930	1.82	290	1.65	212	1.51	154	‡1.47	142
21,	2.36	612	*	760	3.26	1340	4.09	2250	2.74	885	‡1.84	300	1.64	208	1.58	182	1.49	145
22,	2.33	626	.....	760	‡3.16	1240	3.89	2010	2.66	825	1.86	310	1.62	199	1.54	166	1.47	142
23,	2.30	570	.....	760	3.06	1150	3.65	1740	2.54	738	2.02	402	1.61	194	‡1.55	170	1.46	140
24,	2.36	612	.....	760	2.94	1050	3.37	1440	2.46	682	1.81	285	1.61	194	1.56	174	1.49	148
25,	‡2.45	675	.....	760	3.28	1360	3.55	1630	2.38	626	1.84	300	1.61	194	1.53	162	1.50	150
26,	2.54	738	.....	760	4.68	3100	§4.20	2400	2.30	570	1.76	262	‡1.62	199	1.52	158	1.50	150
27,	2.53	731	.....	760	6.58	6700	4.09	2250	2.25	540	1.76	262	1.62	199	1.54	166	‡1.50	150
28,	2.72	870	.....	760	8.72	11800	3.77	1880	2.28	558	§2.00	390	1.74	253	1.54	166	1.50	150
29,	3.30	1380	.....	.....	6.71	6960	3.55	1630	2.18	498	1.94	354	1.68	226	1.72	244	1.52	158
30,	4.56	2910	.....	.....	5.58	4670	3.35	1420	2.14	474	1.77	286	1.70	235	‡1.68	226	1.50	150
31,	†5.18	3940	.....	.....	5.05	3720	.....	.....	‡2.10	450	.....	.....	1.65	212	1.63	204	.....	.....

*Creek frozen Feb. 21-March 17 inclusive, and discharge estimated from Bald Eagle Creek at Milesburg and Spring Creek at Bellefonte. †Max. 5.51 at 5 p. m.—5120 sec. ft. ‡Interpolated. §Estimated.

ESTIMATED MONTHLY DISCHARGE OF BALD EAGLE CREEK AT BEECH CREEK, CLINTON COUNTY, PA.

(Drainage area 585 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	5120	528	865	1.513	1.744
February,	4690	.....	1290	2.283	2.377
March,	11800	.....	2130	3.770	4.346
April,	3080	946	1780	3.150	3.514
May,	5020	450	1410	2.496	2.878
June,	468	258	328	0.581	0.618
July,	414	194	237	0.419	0.483
August,	226	154	186	0.329	0.379
September,	182	140	152	0.269	0.300

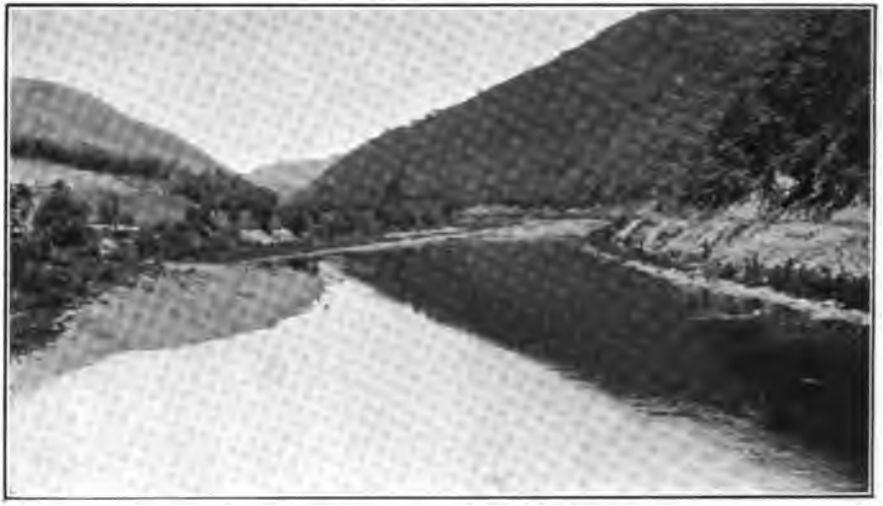
Creek frozen Feb. 21 to March 17 inclusive, and discharge estimated from Bald Eagle Creek at Milesburg and Spring Creek at Bellefonte.

PINE CREEK.

DESCRIPTION OF BASIN.

Pine Creek, one of the major tributaries of the West Branch of the Susquehanna River, drains an area of approximately 975 square miles in Potter, Tioga and Lycoming counties. Rising in the northeastern part of Potter County, on the divide of the Allegheny, Genesee and Susquehanna river basins, it flows in a general southeasterly direction to its mouth at Jersey Shore, Lycoming County, a distance of approximately 75 miles.

The headwaters are steep and rapid, flowing through narrow valleys to Galeton, Potter County, from which point the creek continues in a broader valley and with less fall, passing through extensive marshy areas into Tioga County where it turns southward through a deep, narrow valley with considerable fall walled in on either side by high tableland through which it has cut a channel with steep, precipitous sides nearly to its mouth, where the valley again broadens out. This stream has many tributaries, the most important being West Branch, Marsh Run, Babb Creek and Little Pine Creek. Practically the entire watershed is well covered with second growth timber, there being proportionately little cultivated land. The headwaters of Pine Creek lie within the glacial area. There are numerous small villages in its basin and a few boroughs of considerable size, some of which obtain their water supply therefrom.



Pine Creek Looking Upstream from Gaging Station at Waterville.

The upper part of the watershed is subject to a mean annual precipitation of 35 to 40 inches, while the lower part lies in an area of from 40 to 45 inches.

The discharge has been measured since July 15, 1908, at Waterville, 13½ miles above the mouth.

SUSQUEHANNA BASIN—STATION NO. 25.

PINE CREEK AT WATERVILLE, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, steel, through-truss, highway bridge, about ¾ mile above railroad station at Waterville, Lycoming County.

RECORDS AVAILABLE—Discharge complete from July 15, 1908, to September 30, 1914.

DRAINAGE AREA—750 square miles.

GAGE—A standard chain gage is fastened to the downstream handrail. The length of chain from the bottom of the weight to the marker is 29.68 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is a projection on stone 2.7 feet in from face of right abutment, downstream side of wing, lowest stone; dog mark on stone just at point, elevation 7.088 feet above gage datum. The gage is read twice daily by Robert Myers.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is right end of downstream handrail.

CHANNEL—The channel is straight for 2,000 feet above and 500 feet below the station. The right bank never overflows except in extreme high stages such as the floods of 1865 and 1889. The left bank is high and not subject to overflow. The bed is composed of gravel.

DISCHARGE MEASUREMENTS OF PINE CREEK AT WATERVILLE, LYCOMING COUNTY, PA.

(Drainage area 750 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
33	June 17	Boehringer & Shade,	196	195	0.79	1.18	155	Wading msmt. at bridge.
34	Sept. 2	Bowen & Gough, ...	214	219	1.04	1.36	228	0.6 msmt.

DISCHARGE TABLE FOR PINE CREEK AT WATERVILLE, LYCOMING COUNTY, FROM JAN. 1, 1914.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
.60	25	3.00	1825	.40	6160	.80	12700	.20	20750
.70	35	.10	1955	.50	6410	.90	13000	.30	21120
.80	50	.20	2085	.60	6660	8.00	13300	.40	21490
.90	70	.30	2220	.70	6910	.10	13600	.50	21870
1.00	90	.40	2355	.80	7165	.20	13900	.60	22260
.10	120	.50	2500	.90	7420	.30	14200	.70	22650
.20	160	.60	2645	6.00	7675	.40	14510	.80	23045
.30	210	.70	2790	.10	7930	.50	14830	.90	23445
.40	260	.80	2935	.20	8185	.60	15160	11.00	23850
.50	320	.90	3090	.30	8440	.70	15490	.10	24250
.60		4.00	3250	.40	8700	.80	15830	.20	24650
.70	450	.10	3410	.50	8965	.90	16150	.30	25050
.80	520	.20	3575	.60	9230	9.00	16490	.40	25450
.90	600	.30	3750	.70	9500	.10	16830	.50	25850
2.00	690	.40	3940	.80	9775	.20	17170	.60	26260
.10	790	.50	4130	.90	10050	.30	17515	.70	26670
.20	890	.60	4320	7.00	10325	.40	17860	.80	27080
.30	990	.70	4520	.10	10610	.50	18210	.90	27490
.40	1100	.80	4740	.20	10905	.60	18570	12.00	27900
.50	1220	.90	4970	.30	11200	.70	18930	.10	28320
.60	1340	5.00	5200	.40	11500	.80	19290	.20	28740
.70	1460	.10	5430	.50	11800	.90	19650	.30	29160
.80	1580	.20	5670	.60	12100	10.00	20010	.40	29580
.90	1700	.30	5910	.70	12400	.10	20380	.50	30000

Note:—This table is only applicable subsequent to Jan. 1, 1914, and is based on two discharge measurements made during 1914, together with former curve.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF PINE CREEK AT WATERVILLE, LYCOMING COUNTY, PA.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	*	850	5.82	7220	.....	800	5.62	6710	2.62	1360	1.68	436	1.32	220	1.01	93	1.35	235
2,	.....	850	4.62	4360	.....	800	5.32	5960	2.42	1120	1.68	401	1.22	170	1.01	96	1.32	220
3,	.....	850	3.92	3120	.....	800	4.82	4790	2.32	1010	1.68	401	1.12	128	1.01	93	1.30	210
4,	.....	850	3.97	3200	.....	800	4.22	3610	2.32	1010	1.63	401	1.02	96	1.01	93	1.30	210
5,	.....	850	3.82	2979	.....	800	3.72	2820	2.37	1070	1.53	338	1.02	96	0.96	82	1.30	210
6,	.....	850	3.47	2460	.....	800	3.42	2280	5.42	6210	1.48	308	1.07	111	0.91	72	1.20	160
7,	.....	850	3.27	2180	.....	800	3.17	2050	4.62	4360	1.43	278	1.12	128	0.91	72	1.10	130
8,	.....	850	2.92	1720	.....	800	3.62	2670	3.92	3120	1.38	250	1.17	148	1.06	108	1.15	140
9,	.....	850	2.53	1240	.....	800	4.72	4560	5.72	6960	1.63	401	1.22	170	1.21	165	1.10	120
10,	.....	850	2.42	1120	.....	800	4.92	5020	5.42	6210	1.48	308	1.57	362	1.11	124	1.00	90
11,	.....	850	2.32	1010	.....	800	4.17	3580	4.72	4560	1.38	250	1.82	536	1.11	124	1.00	90
12,	.....	850	*	900	.....	800	3.72	2820	5.53	6460	1.53	225	1.57	362	1.11	124	1.00	90
13,	.....	850	.....	900	.....	800	3.37	2310	8.62	15200	1.23	175	1.37	245	1.11	124	1.00	90
14,	.....	850	.....	900	.....	800	3.12	1980	6.82	9330	1.23	175	1.52	332	1.11	124	1.00	90
15,	.....	850	.....	900	.....	800	3.07	1920	5.13	5480	1.23	175	1.47	302	1.01	93	1.00	90
16,	.....	850	.....	900	.....	3200	3.82	2970	4.27	3700	1.18	152	1.37	245	1.01	96	0.95	80
17,	.....	850	.....	900	.....	3200	3.92	3120	3.57	2600	1.15	140	1.27	195	1.01	93	0.90	70
18,	.....	850	.....	900	4.31	3770	3.77	2890	3.27	2180	1.13	132	1.17	148	1.01	93	0.90	70
19,	.....	850	.....	900	3.36	2300	3.67	2750	2.92	1720	1.13	132	1.12	128	1.01	93	0.90	70
20,	.....	850	.....	900	3.11	1970	3.92	3120	2.62	1360	1.13	132	1.07	111	1.01	93	0.90	70
21,	.....	850	.....	900	2.81	1590	4.12	3440	2.47	1180	1.23	175	1.02	96	1.21	165	0.90	70
22,	.....	850	.....	900	2.56	1290	3.77	2890	2.37	1070	1.23	175	0.97	84	1.66	422	0.90	70
23,	.....	850	.....	900	2.51	1230	3.47	2460	2.22	910	1.13	132	0.92	74	1.51	326	0.90	70
24,	.....	850	.....	900	2.36	1060	3.27	2180	2.02	710	1.13	132	0.92	74	1.41	266	0.90	70
25,	.....	850	.....	900	2.31	1000	3.07	1920	1.97	668	1.13	132	0.92	74	1.56	356	1.00	90
26,	.....	850	.....	900	3.71	2800	3.22	2110	1.82	536	1.28	200	0.92	74	1.41	266	1.00	90
27,	.....	850	.....	900	6.36	9940	3.17	2050	1.82	536	1.13	132	0.97	84	1.31	215	0.90	70
28,	.....	850	.....	[illegible]	†10.36	28300	3.02	1850	1.87	576	1.23	175	1.02	96	1.21	165	0.80	50
29,	.....	850	.....	.....	8.76	15700	2.92	1720	1.82	536	1.48	308	1.02	96	1.31	215	0.80	50
30,	4.43	4000	.....	.....	6.81	9800	2.77	1540	1.82	536	1.38	250	1.02	96	1.46	296	0.80	50
31,	4.80	4740	.....	.....	5.91	7450	.....	.....	1.72	464	.....	.....	1.02	96	1.46	296	.....	.....

*Creek frozen Jan. 1-29 inclusive; Feb. 12-March 17 inclusive, and discharge estimated from Bald Eagle Creek at Beech Creek. †Max. 11.41 at 5 p. m.—25500 sec. ft.

ESTIMATED MONTHLY DISCHARGE OF PINE CREEK AT WATERVILLE, LYCOMING COUNTY, PA.

(Drainage area 750 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	.....	.....	1080	1.440	1.660
February,	7220	.....	1640	2.187	2.277
March,	25500	.....	3280	4.373	5.042
April,	6710	1540	3000	4.000	4.463
May,	15200	464	3010	4.013	4.627
June,	436	132	234	0.312	0.348
July,	536	74	167	0.223	0.257
August,	422	72	162	0.216	0.249
September,	235	50	107	0.142	0.159

Note:—Creek frozen Jan. 1-29 inclusive; Feb. 12-March 17 inclusive, and discharge estimated from Bald Eagle Creek at Beech Creek.

LYCOMING CREEK.

DESCRIPTION OF BASIN.

Lycoming Creek, a tributary of the West Branch of the Susquehanna River in the central part of Lycoming County, drains an approximate area of 275 square miles. Rising in the northeastern corner of Lycoming County, it flows in a general southerly direction through Tioga and Lycoming counties, a distance of 34 miles, to its mouth a short distance above Williamsport. The upper portion of this stream and its tributaries lie within the glacial area, in a sparsely inhabited region well covered with second growth timber, the valleys being generally narrow, the side hills high and steep and the fall rapid. Throughout the lower section the valley is wide and the stream has a flat slope through an agricultural region. There are numerous small tributaries, the largest being Roaring Branch. Only a few villages lie along this stream, the larger being near the mouth. This creek and its tributaries are used to some extent for power purposes by grist mills.

The mean annual precipitation over the greater portion of this watershed is from 40 to 45 inches.

The discharge of this creek has been measured from July 14, 1908, to December 31, 1912, at Bridge No. 2 of the Northern Central Railroad three miles above the mouth, and since December 4, 1913, at Bridge No. 10 near Trout Run.

LYCOMING CREEK AT BRIDGE No. 10 NEAR TROUT RUN, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, steel, through-truss, highway bridge, about 2½ miles above Trout Run, Lycoming County.

RECORDS AVAILABLE—Discharge measurements and gage heights from December 4, 1913, to September 30, 1914.

DRAINAGE AREA—185 square miles.

GAGE—A standard chain gage is attached to the downstream handrail. The length of chain from the bottom of the weight to the marker is 23.39 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is niche cut on top of stone of eleventh course from top, right abutment, downstream side, 1.55 feet in from face of abutment, elevation 8.54 feet above gage datum. The gage is read twice daily by E. L. Apker.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is extreme right end of pipe handrail, downstream side.

CHANNEL—The channel above and below the station is straight for 200 feet and 100 feet respectively. The right bank is of medium height and overflows during extreme high stages. The left bank is high and does not overflow. The bed is composed of gravel and sand, and is very uniform.

DISCHARGE MEASUREMENTS OF LYCOMING CREEK NEAR TROUT RUN, LYCOMING COUNTY, PA.

(Drainage area 185 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
2	Mar. 30,	Matthes,	112	552	3.37	6.38	1858	0.6 msmt.
3	Mar. 31,	Matthes,	112	477	3.13	5.68	1494	0.6 msmt.
4	May 13,	Bowen,	110	702	4.68	7.74	3286	Surf. msmt.
5	May 13,	Bowen,	110	693	4.74	7.66	3286	Surf. msmt.
6	May 13,	Bowen,	110	670	4.13	7.43	2764	Surf. msmt.
7	May 13,	Bowen,	110	659	3.90	7.34	2568	Surf. msmt.
8	May 13,	Bowen,	110	658	4.02	7.27	2649	Surf. msmt.
9	May 13,	Bowen,	110	632	4.06	7.20	2566	Surf. msmt.
10	May 13,	Bowen,	110	626	3.90	7.14	2430	Surf. msmt.
11	May 13,	Bowen,	110	649	3.85	7.10	2497	Surf. msmt.
12	May 14,	Bowen,	110	539	2.97	6.16	1601	Surf. msmt.
13	May 14,	Bowen,	110	534	3.14	6.12	1676	Surf. msmt.
14	May 14,	Bowen,	110	523	3.00	6.06	1570	Surf. msmt.
15	May 14,	Bowen,	110	512	3.04	5.93	1557	0.6 msmt.
16	May 14,	Bowen,	110	501	2.96	5.86	1482	Surf. msmt.
17	May 14,	Bowen,	110	493	3.02	5.80	1488	0.6 msmt.
18	May 15,	Bowen,	109	427	2.63	5.22	1123	Surf. msmt.
19	May 15,	Bowen,	109	418	2.73	5.20	1143	0.6 msmt.
20	May 15,	Bowen,	109	414	2.59	5.17	1072	0.6 msmt.
21	May 15,	Bowen,	109	414	2.49	5.14	1028	Surf. msmt.
22	May 15,	Bowen,	108	413	2.59	5.10	1070	0.6 msmt.
23	May 15,	Bowen,	109	412	2.52	5.08	1040	0.2 and 0.8 msmt.
24	May 15,	Bowen,	109	411	2.60	5.05	1069	0.6 msmt.
25	May 15,	Bowen,	109	408	2.50	5.02	1020	0.6 msmt.
26	May 16,	Bowen,	108	364	2.16	4.64	783	0.6 msmt.
27	May 16,	Bowen,	108	361	2.17	4.63	785	0.6 msmt.
28	May 16,	Bowen,	108	361	2.25	4.66	812	0.6 msmt.
29	June 18,	Boehringer & Shade,	58	60	0.80	2.09	48	Wading 200′ downstream.
30	Sept. 2,	Bowen & Gough,	83	74	0.66	2.09	49	Wading 100′ upstream.

DAILY MEAN GAGE HEIGHTS OF LYCOMING CREEK NEAR TROUT RUN, LYCOMING COUNTY, PA.

1914.	JAN.	FEB.	MAR.	APR.	MAY.	JUNE.	JULY.	AUG.	SEPT.
DAY.	G. H.	G. H.	G. H.	G. H.	G. H.	G. H.	G. H.	G. H.	G. H.
1.	2.95	5.57	2.73	5.52	3.68	2.41	2.08	2.03	2.24
2.	2.85	4.74	2.58	6.45	3.56	2.37	2.10	2.00	2.13
3.	2.98	4.34	2.88	6.89	3.43	2.44	2.07	2.00	2.14
4.	3.00	4.29	2.76	4.72	3.26	2.77	2.03	1.97	2.05
5.	2.95	4.11	2.58	4.39	3.50	2.64	2.00	1.91	2.02
6.	2.90	3.74	2.63	4.12	4.66	2.47	2.09	1.93	2.00
7.	2.85	3.89	2.58	4.22	4.08	2.37	2.16	1.87	1.98
8.	2.80	3.49	2.56	5.69	3.93	2.89	2.12	2.40	1.94
9.	2.82	3.19	2.58	6.05	6.47	2.79	2.06	2.23	1.90
10.	2.90	3.37	2.53	5.12	5.46	2.61	2.43	2.09	1.90
11.	2.90	3.07	2.53	4.67	4.93	2.47	2.53	2.06	1.88
12.	2.78	2.89	2.43	4.42	5.97	2.37	2.80	2.11	1.85
13.	2.65	3.04	2.46	4.15	†7.44	2.27	2.26	2.07	1.90
14.	3.05	2.97	2.56	3.95	6.04	2.24	2.53	2.05	1.89
15.	2.98	3.19	2.56	3.87	5.12	2.17	2.76	2.00	1.85
16.	3.00	3.24	3.18	5.17	4.63	2.19	2.56	1.85	1.85
17.	2.92	3.04	4.00	4.87	4.18	2.11	2.46	1.94	1.82
18.	2.92	2.94	4.30	4.65	3.90	2.09	2.36	1.96	1.80
19.	2.75	2.81	3.83	4.56	3.66	2.08	2.28	1.96	1.77
20.	2.72	2.81	3.50	5.90	3.48	2.12	2.17	2.07	1.72
21.	2.78	2.87	3.23	5.75	3.30	2.10	2.12	3.31	1.80
22.	2.85	2.89	3.23	5.15	3.18	2.10	2.07	2.96	1.80
23.	2.75	2.79	3.18	4.65	3.06	2.08	2.03	2.55	1.76
24.	2.70	2.77	3.06	4.29	2.96	2.06	2.02	2.37	1.81
25.	2.88	2.79	4.08	4.07	2.86	2.05	2.10	2.29	1.78
26.	2.90	2.74	5.20	4.95	2.76	2.02	1.98	2.19	1.75
27.	2.78	2.77	7.31	4.47	2.68	2.08	1.99	2.11	1.76
28.	2.80	2.74	*9.88	4.25	2.60	2.30	2.58	2.13	1.80
29.	2.88	.....	7.22	4.09	2.56	2.32	2.36	2.20	1.78
30.	4.78	.....	6.28	3.89	2.50	2.20	2.16	2.53	1.74
31.	5.67	.....	5.75	.....	2.46	.....	2.08	2.37	.....

*Max. 10.28 at noon. †Max. 8.20 from hydrograph at 3 a. m.

SUSQUEHANNA BASIN—STATION NO. 27.

WEST BRANCH SUSQUEHANNA RIVER AT WILLIAMSPORT, PA.

DESCRIPTION OF STATION.

LOCATION—On five span, steel, through-truss, highway bridge at Market Street, Williamsport, Lycoming County.

RECORDS AVAILABLE—Discharge complete from March 1, 1895, to September 30, 1914.

DRAINAGE AREA—5,670 square miles.

GAGE—A standard U. S. G. S. chain gage is fastened to the hand-rail on the upstream side of the bridge. The length of chain from the bottom of the weight to the marker is 40.17 feet. The elevation of zero is 496.4 feet above sea level. Bench Mark No. 1 is a cut in the face of the left abutment of the bridge, six-teenth course down from the bridge seat, and marked "X", elevation 10 feet above gage datum, or 506.4 feet above sea level. The gage is read twice daily by John R. Mundy.

DISCHARGE MEASUREMENTS—Taken from the upstream side of the bridge. The initial point for soundings is face of abutment on left bank.

CHANNEL—The channel above the station is straight for one-half mile to a wooden dam. Below the station it is straight for several hundred feet. Both banks are high and rocky. The bed is composed of gravel and silt.

REMARKS—The channel is about 1,000 feet wide at the station, and is broken by four bridge piers.

DISCHARGE MEASUREMENTS OF WEST BRANCH SUSQUEHANNA RIVER AT WILLIAMSPORT, LYCOMING COUNTY, PA.

(Drainage area 5,670 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
32	Mar. 29,	Matthes, ...	935	19401	5.86	18.58	113718	Surf. msmt.
33	Mar. 29,	Matthes, ...	935	18562	5.75	17.72	106700	Surf. msmt.
34	June 15,	Boehringer & Shade, .	709	3036	0.60	0.81	1828	0.6 msmt.
35	Aug. 31,	Bowen & Gough, ...	709	2885	0.42	0.56	1229	0.6 msmt.
36	Sept. 30,	Taylor & Brady, ...	238	215	2.67	—0.15	574	Wading msmt. 500′ below dam.

DISCHARGE TABLE FOR WEST BRANCH SUSQUEHANNA RIVER AT WILLIAMSPORT, LYCOMING COUNTY, FROM JAN. 1, 1914.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
—.20	530	.70	9710	.60	25920	.50	48750	.40	82400
—.10	610	.80	9030	.70	26440	.60	49450	.50	83400
0.00	710	.90	9360	.80	26960	.70	50150	.60	84400
.10	810	4.00	9690	.90	27480	.80	50800	.70	85400
.20	920	.10	10040	8.00	28000	.90	51650	.80	86400
.30	1030	.20	10400	.10	28540	12.00	52400	.90	87400
.40	1150	.30	10770	.20	29080	.10	53150	16.00	88400
.50	1270	.40	11150	.30	29620	.20	53900	.10	89420
.60	1400	.50	11540	.40	30160	.30	54650	.20	90440
.70	1530	.60	11940	.50	30700	.40	55450	.30	91460
.80	1680	.70	12340	.60	31240	.50	56250	.40	92480
.90	1840	.80	12750	.70	31780	.60	57050	.50	93500
1.00	2010	.90	13170	.80	32340	.70	57850	.60	94520
.10	2190	5.00	13600	.90	32900	.80	58650	.70	95540
.20	2360	.10	14060	9.00	33460	.90	59450	.80	96560
.30	2550	.20	14470	.10	34020	13.00	60300	.90	97580
.40	2750	.30	14910	.20	34580	.10	61150	17.00	98600
.50	2950	.40	15360	.30	35140	.20	62000	.10	99640
.60	3150	.50	15800	.40	35700	.30	62850	.20	100680
.70	3360	.60	16250	.50	36260	.40	63700	.30	101720
.80	3580	.70	16700	.60	36840	.50	64600	.40	102760
.90	3800	.80	17150	.70	37420	.60	65500	.50	103800
2.00	4030	.90	17600	.80	38000	.70	66400	.60	104840
.10	4260	6.00	18060	.90	38580	.80	67300	.70	105880
.20	4500	.10	18520	10.00	39180	.90	68200	.80	106920
.30	4740	.20	18980	.10	39780	14.00	69100	.90	107960
.40	4990	.30	19460	.20	40380	.10	70000	18.00	109000
.50	5240	.40	19940	.30	40980	.20	70900	.40	113240
.60	5490	.50	20420	.40	41600	.30	71800	.50	114300
.70	5750	.60	20900	.50	42220	.40	72700	19.00	119600
.80	6020	.70	21400	.60	42840	.50	73650	.20	121720
.90	6290	.80	21900	.70	43480	.60	74600	.40	123840
3.00	6580	.90	22400	.80	44120	.70	75550	.60	124900
.10	6870	7.00	22900	.90	44760	.80	76500	20.00	130200
.20	7170	.10	23400	11.00	45400	.90	77450	.40	134520
.30	7470	.20	23900	.10	46050	15.00	78400	.50	135600
.40	7780	.30	24400	.20	46700	.10	79400	.70	137800
.50	8090	.40	24900	.30	47350	.20	80400	21.00	141000
.60	8400	.50	25400	.40	48050	.30	81400		

Note.—This table is only applicable subsequent to Jan. 1, 1914, and is based on three low measurements made in 1914, together with former curve.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF WEST BRANCH SUSQUEHANNA RIVER AT WILLIAMSPORT, LYCOMING COUNTY, PA.

1914	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	H. H.	Dis.	G. H.	Dis.	G. H.	Dis.
1, ...	2.26	4640	a11.89	51600	2.51	5260	10.80	44100	5.26	14700	1.80	3580	0.86	1780	0.28	1010	0.46	1220
2, ...	2.13	4330	11.76	50600	2.50	5240	9.88	38500	4.74	12500	1.67	3300	0.88	1810	0.26	986	0.51	1280
3, ...	2.21	4520	8.87	32700	2.44	5090	9.48	36100	4.18	10300	1.58	3110	0.96	1940	0.22	942	0.47	1230
4, ...	2.49	5220	7.72	26500	2.32	4790	8.91	33000	3.86	9230	1.52	2990	1.16	2290	0.22	942	0.41	1160
5, ...	2.71	5780	7.56	25700	2.21	4520	7.52	25500	3.66	8590	1.51	2970	0.96	1940	0.20	920	0.36	1100
6, ...	2.90	6290	7.92	27600	2.16	4400	6.25	19200	5.87	17500	1.59	3130	0.89	1820	0.18	898	0.31	1040
7, ...	2.71	5780	7.28	24300	2.23	4570	5.72	16800	6.62	21000	1.55	3050	0.79	1660	0.16	876	0.28	1010
8, ...	2.50	5240	6.57	20600	2.14	4360	5.64	16400	6.35	19700	1.46	2870	0.82	1710	0.16	876	0.25	975
9, ...	2.32	4790	5.97	17900	2.08	4210	8.60	31200	7.39	24800	1.53	3010	0.76	1620	0.16	876	0.21	931
10, ...	2.36	4890	4.55	11700	2.00	4030	8.54	30900	9.14	34200	1.45	2850	0.70	1530	0.15	865	0.17	887
11, ...	2.46	5140	3.86	9230	1.92	3850	8.21	29100	8.29	29600	1.22	2400	0.74	1590	0.16	876	0.13	843
12, ...	2.51	5260	3.57	8310	1.80	3580	7.18	23800	8.49	30600	1.04	2080	0.74	1590	0.16	876	0.12	832
13, ...	2.34	4840	3.11	6900	1.72	3400	6.02	18200	13.10	61200	0.96	1940	0.76	1620	0.20	920	0.11	821
14, ...	*2.33	4940	2.90	6290	1.71	3380	5.24	14600	13.33	63100	0.86	1780	0.79	1660	0.22	942	0.11	821
15, ...	2.42	5040	2.90	6290	1.72	3400	4.83	13100	10.18	46800	0.78	1650	0.75	1600	0.20	920	0.09	800
16, ...	2.50	5240	2.92	6350	2.42	5040	6.28	19400	8.12	28600	0.64	1450	0.74	1590	0.23	942	0.05	760
17, ...	2 84	6130	2.90	6290	6.32	19600	8.02	28100	6.40	19960	0.60	1400	0.72	1560	0.22	942	—0.01	700
18, ...	3.14	6990	2.83	6100	10.46	42000	7.44	25100	5.42	15400	0.53	1310	0.66	1430	0.20	920	—0.05	660
19, ...	3.47	8000	2.84	6130	9.24	34800	6.64	21100	5.17	14300	0.52	1300	0.69	1520	0.21	931	—0.11	602
20, ...	3.60	8400	2.86	6180	7.14	23600	7.13	23600	4.62	12000	0.51	1280	0.72	1560	0.22	942	—0.13	556
21, ...	3.40	7780	2.83	6100	5.90	17600	8.14	28800	3.96	9580	0.58	1370	0.69	1520	0.20	1030	—0.12	591
22, ...	3.30	7470	2.76	5910	5.43	15500	7.51	25500	3.62	8460	0.63	1440	0.64	1450	0.54	1320	—0.13	586
23, ...	3.24	7290	2.73	5830	4.77	12600	6.66	21200	3.46	7970	0.61	1410	0.60	1400	0.60	1400	—0.13	586
24, ...	3.18	7110	2.74	5860	4.43	11300	5.90	17600	3.21	7290	0.55	1340	0.53	1300	0.45	1210	—0.13	586
25, ...	3.19	7140	2.74	5860	4.12	10100	5.40	15400	3.03	6810	0.61	1410	0.45	1210	0.40	1150	—0.12	594
26, ...	3.32	7530	2.75	5880	5.40	15400	6.13	18700	2.76	5910	0.82	1710	0.34	1080	0.34	1080	—0.13	586
27, ...	3.72	8770	2.76	5910	11.42	43200	7.42	25000	2.42	5040	0.91	1860	0.28	1010	0.34	1080	—0.16	562
28, ...	3.92	9430	2.66	5650	16.72	96700	7.66	26200	2.22	4550	0.84	1740	0.32	1050	0.33	1070	—0.19	538
29, ...	4.14	10200	.....	.....	b18.28	113000	7.05	23200	2.08	4210	0.85	1760	0.43	1190	0.34	1080	—0.19	538
30, ...	7.52	25500	.....	.....	13.85	67800	5.98	18000	2.18	4450	0.89	1820	0.38	1130	0.33	1130	—0.17	554
31, ...	10.75	43800	.....	.....	12.09	52600	.....	.....	1.95	3920	.....	.....	0.32	1050	0.52	1300	.....	.....

*Frozen under gage Jan. 14-17 inclusive. a=Max. 13.25 at 5 P. M.=63400 sec. ft. b=Max. 18.90 at 8 a. m.=119000 sec. ft.

ESTIMATED MONTHLY DISCHARGE OF WEST BRANCH SUSQUEHANNA RIVER AT WILLIAMSPORT, LYCOMING COUNTY, PA.

(Drainage area 5,670 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	43800	4330	8180	1.443	1.664
February,	62400	5650	14400	2.540	2.645
March,	119000	3880	20900	3.686	4.250
April,	44100	12100	24200	4.268	4.762
May,	63100	3920	17900	3.157	3.640
June,	3580	1280	2110	0.372	0.415
July,	2290	1010	1520	0.268	0.309
August,	1400	965	1010	0.178	0.206
September,	1280	538	799	0.141	0.157

Note.—Frozen under gage Jan. 14-17 inclusive.

BUFFALO CREEK.

DESCRIPTION OF BASIN.

Buffalo Creek, one of the smaller tributaries of the West Branch of the Susquehanna River, drains an area of approximately 128 square miles. The main stream rises in the western part of Union County, and flows in a general northeasterly direction to its mouth at Lewisburg, a distance of 21 miles. Rapid Run, one of the larger tributaries of Buffalo Creek, rises near the Centre-Union county boundary line, and follows a general easterly course to its mouth at Cowan, Union County.

There are many tributaries to the parent stream from the north but, with the exception of a few small runs, there are practically no tributaries from the south. The largest tributaries are Little Buffalo Creek, Spruce Run, Rapid Run and North Branch.

The creek and its tributaries flow through a hilly, well populated agricultural region, the hillsides being covered with second growth timber. The principal towns in its watershed are Lewisburg and Mifflinburg, the latter obtaining its domestic water supply from the North Branch.

The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge has been measured since September 8, 1913, at the covered wooden highway bridge immediately above the mouth of Little Buffalo Creek, 3 miles above the mouth.

SUSQUEHANNA BASIN—STATION NO. 28.

BUFFALO CREEK NEAR LEWISBURG, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, through-truss, wooden covered bridge, known as Nogels Bridge, about ¼ mile above mouth of Little Buffalo Creek.

RECORDS AVAILABLE—Discharge measurements and gage heights from September 8, 1913, to September 30, 1914.

DRAINAGE AREA—107 square miles.

GAGE—A sectional chain gage is attached to the downstream guard-rail. The length of chain from the bottom of the weight to the marker is 15.00 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is a niche cut in the cement joint on the center of the end of the downstream wingwall of the left abutment, 5.45 feet down from top of concrete coping, elevation 9.04 feet above gage datum. The gage is read twice daily by Wm. W. Haas.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge between the eaves and weather boarding, and by wading during low water below bridge. The initial point for soundings is top edge of left abutment.

CHANNEL—The channel above the station curves to the left immediately above the bridge. The channel below the station curves to the right immediately below the bridge. The right bank is subject to overflow during extreme high stages. The left bank does not overflow. The bed is composed of gravel and there is good velocity under the bridge at all stages.

DISCHARGE MEASUREMENTS OF BUFFALO CREEK NEAR LEWISBURG, UNION COUNTY, PA.

(Drainage area 107 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
5	June 18,	Boehringer & Shade,..	78	54	0.96	1.07	52	Wading msmt. below bridge.
6	Sept. 3,	Bowen & Gough, ...	60	27	0.70	0.84	19	Wading msmt. below bridge.

DAILY MEAN GAGE HEIGHTS OF BUFFALO CREEK NEAR LEWISBURG, UNION COUNTY, PA.

1914. DAY.	JAN. G. H.	FEB. G. H.	MAR. G. H.	APR. G. H.	MAY. G. H.	JUNE. G. H.	JULY. G. H.	AUG. G. H.	SEPT. G. H.
1,	1.47	2.08	1.90	2.67	1.92	1.36	0.95	0.82	0.86
2,	1.49	2.73	1.93	2.67	1.89	1.36	1.02	0.89	0.80
3,	1.59	2.26	2.03	2.72	1.92	1.31	0.89	0.95	0.80
4,	1.99	2.10	2.06	2.47	1.92	1.34	1.02	0.89	0.90
5,	2.04	2.03	2.03	2.32	2.32	1.41	1.09	0.79	0.76
6,	1.91	1.68	1.68	2.07	2.12	1.21	1.15	0.85	0.76
7,	1.77	1.96	1.80	2.09	1.82	1.13	1.09	0.82	0.73
8,	1.41	2.00	1.76	2.85	1.69	1.31	1.12	0.92	0.76
9,	1.49	*2.43	1.53	2.62	4.59	1.31	1.15	0.85	0.86
10,	1.41	2.38	1.58	2.22	2.62	1.28	1.15	0.85	0.83
11,	1.49	1.88	1.53	2.35	2.37	1.11	1.25	0.95	0.76
12,	1.74	2.08	1.48	2.27	3.57	1.04	1.17	1.05	0.80
13,	*2.04	2.16	1.48	1.87	3.37	1.06	1.19	0.82	0.80
14,	1.87	2.10	1.50	1.79	2.92	1.08	1.25	0.82	0.76
15,	1.79	2.06	1.70	1.92	2.72	0.94	1.25	0.82	0.73
16,	1.89	2.16	2.53	2.67	2.35	0.84	1.17	0.77	0.78
17,	1.74	2.23	3.86	2.55	2.09	0.91	1.19	0.85	0.76
18,	1.77	2.20	3.48	2.19	1.99	1.01	1.13	0.79	0.76
19,	1.71	2.18	3.30	2.07	1.97	1.08	1.02	0.86	0.76
20,	1.69	2.16	2.90	4.17	1.87	1.11	1.02	1.09	0.70
21,	1.71	2.13	2.13	3.85	1.79	1.11	0.99	1.19	0.73
22,	1.61	2.16	2.06	3.35	1.72	1.06	1.22	0.95	0.76
23,	1.67	2.20	2.00	2.72	1.69	1.01	1.19	0.82	0.73
24,	1.69	2.18	2.00	2.37	1.59	0.91	1.17	0.79	0.83
25,	1.84	2.10	1.98	2.32	‡	1.11	1.02	0.85	0.76
26,	1.69	2.06	2.86	3.65	.....	1.14	0.85	0.79	0.70
27,	1.61	1.78	3.58	3.47	.....	1.36	0.95	0.75	0.70
28,	1.54	1.83	5.00	3.39	.....	1.64	0.87	0.85	0.70
29,	1.67	.....	4.33	2.97	1.47	1.54	0.87	0.95	0.68
30,	1.84	.....	4.13	2.25	1.55	1.24	0.85	0.87	0.76
31,	†4.21	.....	3.30	.....	1.27	.....	0.89	0.82	.....

*Creek frozen Jan. 13-27 inclusive, Feb. 9-Mar. 17 inclusive. †Max. 6.44 at 4:30 P. M. ‡Observer lost key to gage.

SUSQUEHANNA BASIN—STATION NO. 29.

WEST BRANCH SUSQUEHANNA RIVER AT LEWISBURG, PA.

DESCRIPTION OF STATION.

LOCATION—On the Market Street Bridge, Lewisburg, Union County.

RECORDS AVAILABLE—Gage heights from September 21, 1913, to September 30, 1914.

DRAINAGE AREA—6,830 square miles.

GAGE—A gage is painted on the first pier from abutment, and is graduated to feet and quarter feet. It is read twice daily by T. E. Irland.

CHANNEL—The channel is straight above and below the bridge for several hundred feet. The right bank is high and steep. The left bank is of medium height and liable to overflow during extreme high stages. The bed is composed of gravel.

DAILY MEAN GAGE HEIGHTS OF WEST BRANCH SUSQUEHANNA RIVER AT LEWISBURG, UNION COUNTY, PA.

1914. DAY.	JAN. G. H.	FEB. G. H.	MAR. G. H.	APR. G. H.	MAY. G. H.	JUNE G. H.	JULY. G. H.	AUG. G. H.	SEPT. G. H.
1,	1.50	11.12	2.50	10.00	4.12	1.50	0.50	0.00	0.50
2,	1.50	10.25	*2.50	8.62	3.62	1.50	0.75	0.00	0.50
3,	1.50	7.88	2.50	8.25	3.12	1.25	0.75	0.00	0.50
4,	1.50	7.12	2.50	8.38	2.88	1.25	0.50	0.00	0.50
5,	1.50	6.38	2.50	5.88	2.62	1.00	0.25	0.00	0.50
6,	1.50	5.50	2.50	5.12	3.75	1.00	0.00	0.00	0.25
7,	1.50	5.12	2.62	4.50	5.25	1.00	0.00	0.00	0.25
8,	1.50	4.62	2.75	4.38	5.25	1.25	0.00	0.00	0.25
9,	1.75	4.12	2.88	7.50	5.88	1.12	0.00	0.00	0.25
10,	1.75	3.00	1.62	7.88	7.00	1.00	0.00	0.00	0.25
11,	1.75	2.75	1.38	6.88	6.75	0.75	0.00	0.25	0.25
12,	1.75	2.38	1.00	5.50	6.88	0.75	0.00	0.25	0.00
13,	1.75	2.25	1.00	4.62	10.00	0.75	0.00	0.25	0.00
14,	1.75	2.00	1.00	4.12	12.00	0.75	0.00	0.25	0.00
15,	*1.75	2.00	1.00	3.88	9.50	0.75	0.00	0.25	0.00
16,	3.00	2.00	1.50	4.50	7.62	0.75	0.00	0.25	0.00
17,	6.38	2.00	3.62	6.12	5.62	0.50	0.00	0.25	0.00
18,	6.88	2.00	3.38	6.25	4.88	0.50	0.25	0.25	0.00
19,	6.75	1.75	7.75	5.88	3.25	0.25	0.50	0.00	0.00
20,	6.50	1.75	6.00	6.62	2.63	0.00	0.50	0.00	—0.25
21,	6.12	1.75	5.00	7.50	2.50	0.00	0.25	0.25	—0.25
22,	5.62	1.75	3.88	6.62	2.50	0.00	0.25	0.50	—0.25
23,	5.00	1.75	3.62	5.88	2.25	0.00	0.25	0.50	—0.25
24,	5.38	1.75	3.38	5.12	2.00	0.00	0.25	0.25	—0.25
25,	7.12	1.50	3.00	4.50	2.00	0.00	0.25	0.25	—0.25
26,	7.00	1.50	4.12	4.38	1.75	0.00	0.00	0.25	—0.25
27,	7.00	2.50	8.25	5.88	1.50	0.25	0.00	0.00	—0.25
28,	7.00	2.75	14.67	6.12	1.50	0.62	0.00	0.00	—0.25
29,	7.00	.....	17.12	5.50	1.50	0.50	0.00	0.25	—0.25
30,	7.25	.....	14.25	4.62	1.50	0.50	0.00	0.25	—0.25
31,	9.38	.....	12.00	.....	1.50	.....	0.00	0.25	.....

*River frozen Jan. 15-31 inclusive, Mar. 2-11 inclusive.

SUSQUEHANNA RIVER.

DESCRIPTION OF BASIN.

The Susquehanna River, the largest stream in the State, is formed by the junction of the North and West branches at Northumberland, Northumberland County, Pa. The North Branch, together with the section below the junction of the two branches, is now recognized as the Susquehanna River, but for convenience the old nomenclature has been retained.

From Northumberland the river follows a nearly southerly course to its junction with the Juniata River near Duncannon, Perry County, at which point it cuts through the North Mountain, turning to the southeast and continuing this course to its mouth in Chesapeake Bay, at Havre-de-Grace, Md. From Northumberland to a point about 12 miles below Columbia the river is wide and shallow, averaging about one mile in width, with a slope of 2.6 feet per mile, breaking through a series of parallel ridges in the upper portion, and crossing the Cumberland Valley in the lower portion. About 23 miles above the Maryland-Pennsylvania state line the stream enters a gorge where it cross the Piedmont Plateau and becomes a more narrow and rapid stream, with an average fall of 6.1 feet per mile, continuing this character until it leaves the state.

The prominent tributaries are the West and North branches, Juniata River and Pennsylvania, Sherman, Conodoguinet, Swatara, Conestoga, Pequea, Conewago, Codorus and Octoraro creeks.

The total length of the Susquehanna River from Northumberland to the state boundary is 110 miles. The drainage basin of the stream in Pennsylvania is approximately 21,320 square miles, or 47.2 per cent. of the entire area of the state, while the total area tributary at the Pennsylvania-Maryland state line is approximately 27,590 square miles.

The Susquehanna River is not navigable, except locally for small, flat bottom boats, adapted for local trade and pleasure and this only during certain seasons of the year. Canals formerly followed its banks and those of the North and West branches, Juniata River and Swatara Creek, but they are now abandoned. This entire basin is largely deforested but it is to some extent in process of regrowth. The streams are subject to sudden rises and to extremely low summer flow. There are few natural lakes or ponds in the Middle and Lower Susquehanna sub-basins.

The nearly uniform slope, which exists from Northumberland to York Haven, is broken at the latter point by rapids, and again in the gorge below Columbia. The water power on this stream at present is developed at York Haven and McCall's Ferry.

Some of the tributaries of the West Branch and Juniata River, together with Swatara, Yellow Breeches and Conodoguinet creeks drain limestone areas. The North Branch drains the anthracite coal fields, as do certain of the tributaries of the main stream, among them Mahanoy, Shamokin, Mahantonga and Wiconisco creeks.

The chief municipalities on the main river and its tributaries below Northumberland are Sunbury, Altoona, Hollidaysburg, Tyrone, Huntingdon, Lewistown, Harrisburg, Shamokin, Shenandoah, Lebanon, York, Lancaster and Columbia. The main river, both branches

and many of its tributaries are followed by the Pennsylvania or the Philadelphia and Reading railroads.

The mean annual rainfall over the entire Susquehanna basin in Pennsylvania is approximately 41 inches.

The discharge is being measured at Harrisburg, on the main stream, and at Towanda, Wilkes-Barre, Danville and Conklin, on the North Branch, Bower, Clearfield, Renovo, Williamsport, and Lewisburg, on the West Branch, and Newport on the Juniata River. Prior to January 1, 1910, the discharge was obtained on the main river at McCall's Ferry. This station was discontinued, due to the erection of a large concrete dam, near the station. A flood warning station is maintained at Selinsgrove, Snyder County.

SUSQUEHANNA BASIN—STATION NO. 30.

SUSQUEHANNA RIVER AT SELINSGROVE, PA.

DESCRIPTION OF STATION.

LOCATION—On railroad bridge of P. R. R. between Selinsgrove Junction and Selinsgrove.

RECORDS AVAILABLE—Daily gage heights from March 19, 1914. Prior to this date gage heights were obtained by the U. S. Weather Bureau from October 1, 1892.

DRAINAGE AREA—18,500 square miles.

GAGE—A painted pier gage is located on the west side of the second pier, 12 inches wide, graduated between 0 and 22 feet. The elevation of zero is 411.6 feet above sea level. Bench Mark No. 1 is top of pier on which gage is painted, 22 feet above zero of gage and 433.6 feet above sea level. Bench Mark No. 2 is top of rail on bridge above gage, 27.7 feet above zero of gage and 439.3 feet above sea level. The gage is read twice daily by H. E. Richter.

CHANNEL—The channel is straight both above and below the station, and is divided by a large island. Both banks are high. The bed is rocky.

REMARKS—Only gage heights are obtained at this station, which has been established for Flood Warning purposes.

DAILY MEAN GAGE HEIGHTS OF SUSQUEHANNA RIVER AT SELINSGROVE, SNYDER COUNTY, PA.

1914. DAY.	MAR. G. H.	APR. G. H.	MAY. G. H.	JUNE. G. H.	JULY. G. H.	AUG. G. H.	SEPT. G. H.
1,	.....	11.80	5.00	1.75	0.90	0.65	0.80
2,	.....	†10.20	4.70	1.55	0.90	0.55	0.80
3,	.....	9.90	4.25	1.50	1.05	0.50	1.05
4,	.....	9.55	3.80	1.40	0.90	0.50	1.05
5,	.....	8.05	3.65	1.30	0.80	0.50	0.90
6,	.....	6.80	3.90	1.40	0.75	0.45	1.15
7,	.....	5.95	6.15	1.45	0.70	0.40	1.25
8,	.....	5.35	6.90	1.40	0.70	0.40	1.05
9,	.....	8.25	5.90	1.60	0.65	0.40	0.85
10,	.....	10.40	6.50	1.45	0.60	0.40	0.70
11,	.....	9.20	6.45	1.30	0.65	0.55	0.65
12,	.....	7.75	6.25	1.30	1.55	0.60	0.60
13,	.....	6.70	8.05	1.30	1.30	0.55	0.45
14,	.....	5.90	‡11.50	1.30	1.45	0.50	0.40
15,	.....	5.35	10.50	1.00	1.55	0.50	0.30
16,	.....	5.60	7.90	0.90	1.60	0.45	0.20
17,	.....	6.75	6.30	0.90	1.60	0.45	0.20
18,	.....	7.40	5.20	0.80	1.50	0.50	0.20
19,	6.70	6.80	4.55	0.70	1.20	0.50	0.20
20,	6.00	6.70	4.05	0.70	1.10	0.55	0.20
21,	4.80	8.33	3.55	0.80	1.00	0.65	0.15
22,	4.10	8.75	3.05	0.80	1.00	0.85	0.10
23,	3.75	8.00	2.85	0.70	0.90	2.00	0.00
24,	3.55	6.95	2.70	0.70	0.80	2.65	0.00
25,	3.45	5.90	2.40	0.80	0.70	2.25	0.00
26,	4.05	5.55	2.15	0.80	0.70	1.85	0.00
27,	8.03	6.75	2.05	0.80	0.70	1.20	—0.05
28,	13.04	7.00	1.95	0.90	0.70	1.00	—0.10
29,	*15.75	6.30	2.15	1.00	0.85	0.95	—0.10
30,	15.25	5.45	2.25	1.00	0.95	0.85	—0.10
31,	13.30	.....	2.00	.....	0.75	0.90	.....

*Max. 16.00′ at 5 P. M. †Max. 12.1′ at 8 A. M. ‡Max. 11.80 at 5 P. M.

RAYSTOWN BRANCH JUNIATA RIVER.

DESCRIPTION OF BASIN.

With the Frankstown Branch, which it joins six miles below Huntingdon, the Raystown Branch forms the Juniata River. This branch rises on the eastern slope of the Allegheny Mountains in the eastern part of Somerset County and, passing into Bedford County, flows easterly to near its eastern border where it turns northward following a most tortuous course into Huntingdon County at Saxton. Through Huntingdon County it follows a winding, serpentine course, in a general northwest direction to its mouth. The total length of the stream is approximately 110 miles, and its drainage basin comprises

1,012 square miles. The largest tributaries are Trough, Yellow, Shavers, Cove and Dunning creeks. In the western part of Bedford County the stream drains a limestone region, while its larger tributaries drain well timbered, sparsely developed areas. The tributaries coming in from the east between Hopewell and Saxton drain the Broad Top mountain soft coal district, while Great Trough Creek drains the coal district at Robertsdale and Woodvale.

In Bedford County the stream and its tributaries are considerably used for domestic and industrial water supply. At Hawn's Bridge, Huntingdon County, 10 miles above the mouth, a 28 foot dam has been built, and a 3,600 H. P. water power plant erected. For over 40 miles above its mouth there is no railroad in the valley, which is quite an exception for so large a stream.

The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge has been measured since August 31, 1911, at Saxton, Bedford County.

SUSQUEHANNA BASIN—STATION NO. 31.

RAYSTOWN BRANCH JUNIATA RIVER AT SAXTON, PA.

DESCRIPTION OF STATION.

LOCATION—On two span, steel, through-truss, highway bridge between Stonestown and Saxton Furnace, Bedford County.

RECORDS AVAILABLE—Discharge complete from August 31, 1911, to September 30, 1914.

DRAINAGE AREA—790 square miles.

GAGE—A standard chain gage is fastened to the downstream handrail. The length of chain from the bottom of the weight to the marker is 27.51 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is chiseled on stone on right downstream wingwall, on top of stone twelfth course down from top, and fifth course from bottom, elevation 9.65 feet above gage datum. The gage is read twice daily by D. R. Jenkins.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is bridge pin, right downstream side.

CHANNEL—The channel above the station curves slightly to the right approximately 300 feet above the bridge. Below the station it is straight for 300 feet. Both banks are high but overflow during extreme high stages. The bed is composed of sand gravel and stones.

DISCHARGE MEASUREMENTS OF RAYSTOWN BRANCH JUNIATA RIVER AT SAXTON, BEDFORD COUNTY, PA.

(Drainage area 790 square miles.)

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
11	Jan. 31,	Brown, ...	297	1832	4.08	6.64	7479	Surf. msmt.
12	Feb. 1,	Brown, ...	297	2036	4.58	7.31	9330	Surf. msmt.
13	Feb. 1,	Brown, ...	297	1978	4.52	7.12	8938	Surf. msmt.
14	Feb. 1,	Brown, ...	295	1876	4.33	6.82	8132	Surf. msmt.
15	Feb. 1,	Brown, ...	295	1819	4.22	6.62	7682	Surf. msmt.
16	Feb. 2,	Brown, ...	297	1381	3.32	5.12	4583	Surf. msmt.
17	Feb. 2,	Brown, ...	296	1.01	2.84	4.52	3411	Surf. msmt.
18	Feb. 3,	Brown, ...	296	1173	2.79	4.43	3268	Surf. msmt.
19	Sept. 5,	Taylor & Gough, ...	136	185	0.54	0.99	100	0.6 msmt.

DISCHARGE TABLE FOR RAYSTOWN BRANCH JUNIATA RIVER AT SAXTON, BEDFORD COUNTY, FROM AUG. 31, 1911.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
0.70	105	.20	600	.70	2290	.20	4665	.70	7885
.80	115	.30	675	.80	2420	.30	4855	.80	8120
.90	130	.40	760	.90	2560	.40	5050	.90	8360
1.00	145	.50	865	4.00	2700	.50	5250	7.00	8600
.10	160	.60	970	.10	2850	.60	5450	.10	8850
.20	180	.70	1080	.20	3000	.70	5660	.20	9100
.30	205	.80	1190	.30	3150	.80	5870	.30	9375
.40	230	.90	1300	.40	3300	.90	6085	.40	9650
.50	260	3.00	1420	.50	3455	6.00	6300	.50	9925
.60	295	.10	1540	.60	3610	.10	6515	.60	10200
.70	330	.20	1660	.70	3775	.20	6730	.70	10485
.80	370	.30	1780	.80	3945	.30	6955	.80	10770
.90	415	.40	1905	.90	4120	.40	7180	.90	11070
2.00	470	.50	2030	5.00	4300	.50	7415	8.00	11370
.10	530	.60	2160	.10	4480	.60	7650		

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF RAYSTOWN BRANCH JUNIATA RIVER AT SAXTON, BEDFORD COUNTY, PA.

1911. DAY.	AUG.		SEPT.		OCT.		NOV.		DEC.	
	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	.....	.....	5.94	6170	2.40	760	1.96	448	1.71	334
2,	.....	.....	3.82	2450	2.88	1280	1.88	406	1.64	309
3,	.....	.....	2.96	1370	3.08	1520	1.72	338	1.66	316
4,	.....	.....	2.40	760	2.86	1260	1.70	330	1.64	309
5,	.....	.....	2.06	506	2.78	1170	1.64	309	1.57	284
6,	.....	.....	2.03	488	2.32	692	1.72	338	1.53	270
7,	.....	.....	2.52	886	2.28	660	2.38	743	1.47	251
8,	.....	.....	1.95	442	2.68	1060	2.65	1020	1.53	270
9,	.....	.....	2.87	1270	2.22	615	2.50	865	1.55	278
10,	.....	.....	4.64	3680	2.16	572	2.50	865	1.47	251
11,	.....	.....	3.42	1930	2.14	558	2.18	586	1.48	254
12,	.....	.....	2.98	1400	2.25	638	2.09	524	1.49	257
13,	.....	.....	2.40	760	2.06	506	2.02	482	1.48	254
14,	.....	.....	2.06	506	1.86	397	2.10	530	1.45	245
15,	.....	.....	3.72	2320	1.85	392	1.92	426	1.83	334
16,	.....	.....	7.08	5300	1.84	388	1.94	437	3.59	2150
17,	.....	.....	5.20	4060	1.83	406	1.83	384	5.11	4500
18,	.....	.....	3.83	2530	2.85	1240	2.01	476	4.13	2900
19,	.....	.....	3.27	1740	3.68	2260	2.51	876	3.38	1880
20,	.....	.....	2.92	1320	3.12	1560	2.35	718	3.01	1430
21,	.....	.....	2.54	907	2.84	1230	2.34	709	2.68	1060
22,	.....	.....	2.41	770	2.12	544	2.29	668	2.69	1070
23,	.....	.....	2.48	844	3.05	1480	2.16	572	3.25	1720
24,	.....	.....	2.07	512	2.79	1130	2.04	494	3.58	2130
25,	.....	.....	1.92	426	2.62	992	2.04	494	3.39	1890
26,	.....	.....	1.80	370	2.45	812	1.98	459	3.29	1770
27,	.....	.....	1.68	323	2.34	709	1.90	415	4.73	3330
28,	.....	.....	1.80	370	2.30	675	1.86	397	4.68	3740
29,	.....	.....	2.44	802	2.18	586	1.84	388	3.63	2200
30,	.....	.....	3.62	2190	2.07	512	1.87	402	3.55	2100
31,	5.92	6130	.....	.....	2.01	476	.....	.....	3.37	1870

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF RAYSTOWN BRANCH JUNIATA RIVER AT SAXTON, BEDFORD COUNTY, PA.

1912.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.		OCT.		NOV.		DEC.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	4.10	2850	.....	650	3.18	1640	4.05	2780	3.73	2330	1.75	350	1.79	366	2.22	615	1.26	195	2.21	608	1.45	245	1.27	198
2,	3.36	1860	.....	650	2.66	1040	3.92	2590	3.49	2020	1.84	388	1.62	302	2.09	524	1.26	195	2.06	518	1.37	222	1.33	212
3,	3.20	1660	.....	650	2.38	743	4.23	3120	3.21	1670	1.96	448	1.49	257	2.09	524	1.81	374	1.98	459	1.23	188	1.37	222
4,	2.95	1360	.....	650	2.38	743	4.00	2700	2.97	1380	1.74	346	1.36	220	1.99	464	2.66	1040	1.71	334	1.30	205	1.57	284
5,	2.48	844	.....	650	2.22	615	3.42	1930	2.77	1160	1.56	281	1.47	251	1.82	379	2.58	949	1.65	312	1.37	222	1.37	222
6,	*	990	.....	650	2.12	544	3.15	1600	2.59	960	1.50	260	1.36	220	1.66	316	2.16	572	1.54	274	1.33	212	1.65	312
7,	.....	990	.....	650	2.06	506	2.95	1360	2.81	1200	1.42	236	1.29	202	1.58	288	1.88	406	1.46	248	1.35	218	2.05	500
8,	.....	990	.....	650	2.24	630	2.95	1360	4.24	3060	1.38	225	1.31	208	1.51	264	1.81	374	1.41	238	g3.90	2560	2.10	530
9,	.....	990	.....	650	2.80	1190	2.72	1100	3.63	2200	1.40	230	1.27	198	1.48	254	1.71	334	1.42	236	3.05	1480	2.03	488
10,	.....	990	.....	650	2.72	1100	2.52	886	3.22	1680	1.60	295	1.35	218	1.67	320	1.52	267	1.74	346	2.79	1180	1.87	402
11,	.....	990	.....	650	2.19	593	2.42	781	2.89	1290	1.28	200	1.39	228	1.79	366	1.41	233	2.35	718	2.37	734	1.53	270
12,	.....	990	.....	650	2.20	600	2.32	692	3.03	1460	1.23	188	1.33	212	1.61	298	1.32	210	1.70	330	2.25	638	1.33	212
13,	.....	990	.....	650	2.47	834	2.34	709	f8.09	†11600	1.18	176	1.32	210	1.69	326	1.26	195	1.58	288	2.14	558	1.23	188
14,	.....	990	.....	650	3.35	1840	2.40	760	5.34	4930	1.20	180	1.29	202	1.75	350	1.22	185	1.48	254	2.00	470	1.33	212
15,	.....	990	.....	650	b6.69	7860	2.32	692	4.59	3590	1.19	178	1.35	218	1.53	270	1.18	176	1.34	215	1.93	432	1.43	239
16,	.....	990	.....	650	7.14	8950	2.18	586	4.69	3760	2.23	622	1.27	198	1.41	233	1.24	190	1.24	190	1.87	402	1.63	306
17,	.....	990	.....	650	5.00	4300	2.28	660	7.71	10500	e5.43	5110	1.45	245	1.32	210	1.22	185	1.12	164	1.77	358	1.50	280
18,	.....	990	.....	650	4.38	3270	c4.78	3910	5.54	5330	3.86	2500	3.88	2530	1.28	200	1.28	200	1.18	176	1.63	306	1.48	254
19,	.....	990	.....	650	4.28	3120	4.41	3320	4.49	3440	2.88	1280	5.12	4520	1.35	218	1.21	182	1.18	176	1.60	260	1.58	288
20,	.....	990	.....	650	5.12	4520	3.66	2240	3.89	2550	2.38	743	3.49	2020	1.63	306	1.22	185	1.11	162	1.45	245	1.55	278
21,	.....	990	.....	650	6.95	8480	3.30	1780	3.39	1890	2.10	530	4.42	3330	1.71	334	1.18	176	1.24	190	1.55	278	1.50	260
22,	.....	990	.....	650	8.24	†12100	3.20	1660	3.04	1470	2.03	488	f6.09	6490	1.65	312	1.16	172	1.24	190	1.53	270	1.40	230
23,	.....	990	.....	650	5.90	6080	3.24	1710	2.77	1160	1.96	448	4.32	3180	1.45	245	1.31	208	1.46	248	1.35	218	1.10	160
24,	.....	990	.....	650	5.25	4760	2.94	1350	2.57	938	1.80	370	5.27	4800	1.33	212	1.76	354	1.64	309	1.37	222	1.18	176
25,	.....	850	.....	650	5.40	5050	2.76	1150	2.34	709	2.13	551	4.62	3640	1.35	218	5.06	4410	1.94	437	1.43	239	1.30	205
26,	.....	850	a5.97	6240	4.50	3460	2.75	1140	2.17	579	2.06	506	4.12	2880	1.29	202	4.94	4190	1.88	406	1.35	218	1.38	225
27,	.....	850	7.72	10500	4.16	2940	3.35	1840	2.05	500	1.98	459	3.39	1890	1.22	185	4.68	3740	1.71	334	1.35	218	1.50	260
28,	.....	850	5.13	4540	3.96	2640	3.55	2100	2.01	476	1.80	370	2.85	1240	1.19	178	3.40	1900	1.62	302	1.35	218	1.32	210
29,	.....	850	4.07	2900	4.96	4230	3.38	1880	2.03	488	1.70	330	2.55	913	1.23	188	2.98	1400	1.54	274	1.33	212	1.18	176
30,	.....	850	.....	.....	5.60	5450	3.72	2320	2.01	476	2.10	530	3.17	1620	1.19	178	2.68	1060	1.58	288	1.27	198	1.00	295
31,	.....	850	.....	.....	4.78	3910	.....	.....	1.94	437	.....	.....	2.59	960	1.29	202	....	....	1.54	274	.....	....	2.30	675

*Creek frozen Jan 6 to Feb. 25 incl. and discharge estimated from Frankstown Br. Juniata River at Huntingdon. †Estimated. a. Ice went out. b. Max. 8.74′ at 7.00 a. m.=13500 sec. ft. c. Max. 5.05′ at 5.45 p. m.=4890 sec. ft. d. Max. 8.59′ at 7.45 a. m.=13000 sec. ft. e. Max. 5.88′ at 7.45 a. m.=6040 sec. ft. f. Max. 6.52′ at 6.15 a. m.=7440 sec. ft. g. Max. 4.55′ at 8 a. m.=3530 sec. ft.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF RAYSTOWN BRANCH JUNIATA RIVER AT SAXTON, BEDFORD COUNTY, PA.

1913.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.		OCT.		NOV.		DEC.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	3.01	1430	2.45	312	2.62	992	3.20	1660	2.13	551	4.08	2820	1.18	176	1.16	172	0.77	112	2.11	537	2.33	700	2.25	638
2,	2.59	960	2.01	476	2.47	834	3.00	1420	2.07	512	3.53	2070	1.18	176	1.18	176	0.87	125	2.69	1070	2.20	600	2.27	652
3,	2.53	896	2.03	488	2.32	692	3.04	1470	1.95	442	3.13	1580	1.22	185	1.04	151	0.74	109	2.34	709	2.13	551	2.27	652
4,	3.91	2570	1.99	464	2.28	660	2.92	1320	1.95	442	2.88	1280	1.16	172	1.58	288	0.79	114	2.36	726	1.93	432	2.32	615
5,	3.26	1730	1.93	432	2.14	558	2.70	1080	1.81	374	2.53	896	1.19	178	1.50	260	0.81	116	1.96	448	1.86	397	2.19	598
6,	2.96	1370	2.01	476	2.04	494	2.50	865	1.85	392	2.28	660	2.29	668	0.94	136	0.74	109	1.76	354	1.78	362	2.17	579
7,	3.61	2170	1.96	448	2.02	482	2.30	675	1.85	392	2.21	608	1.74	346	1.06	154	0.97	140	1.63	306	1.76	354	2.52	886
8,	5.63	5510	2.03	488	1.90	415	2.24	630	1.73	342	2.11	537	1.54	274	1.22	185	1.11	162	1.56	281	1.76	354	3.32	1800
9,	6.46	7320	2.79	1180	1.87	402	2.07	512	1.88	406	2.08	518	1.42	236	1.22	185	1.11	162	1.53	270	3.48	2000	3.62	2190
10,	4.87	4070	2.71	1090	1.90	415	2.04	494	1.69	326	1.88	406	1.56	281	0.94	136	1.51	264	1.58	288	d7.18	9050	3.12	1560
11,	3.91	2570	2.36	726	1.87	402	2.17	579	1.48	254	1.71	334	1.66	316	1.00	145	1.34	215	1.58	288	4.68	3740	2.95	1860
12,	4.83	4000	2.11	537	2.24	630	2.40	760	1.51	264	1.75	350	1.56	281	1.02	148	1.31	208	1.68	323	3.68	2260	2.72	1100
13,	4.91	4140	2.03	488	2.17	579	2.47	834	1.53	270	1.53	270	1.42	236	1.12	164	1.29	202	2.06	506	3.38	1880	2.55	918
14,	4.26	3090	1.99	464	2.24	630	2.17	579	1.57	284	1.51	264	1.26	196	1.08	157	1.17	174	1.80	370	3.13	1580	2.45	812
15,	3.53	2070	1.86	397	2.14	558	2.50	865	1.53	270	1.51	264	1.24	190	1.06	152	1.17	174	1.68	323	2.98	1400	2.27	652
16,	3.29	1770	1.89	410	2.08	518	3.50	2030	1.59	292	1.45	245	1.19	178	1.18	176	1.21	182	1.60	295	3.18	1640	2.22	615
17,	3.43	1940	2.03	488	2.54	907	4.10	2850	1.63	306	1.49	239	1.22	185	1.05	152	1.19	178	1.50	260	4.68	3740	2.12	544
18,	3.33	1820	2.01	476	2.52	886	3.72	2320	1.65	312	1.45	245	1.22	185	1.05	152	1.27	198	1.56	281	4.13	2900	2.06	518
19,	3.13	1580	1.99	464	2.57	933	3.17	1620	1.53	270	1.53	270	1.29	202	0.95	138	1.29	202	1.48	264	3.48	2000	2.05	500
20,	3.21	1670	1.81	374	2.77	1160	2.62	992	1.51	264	1.45	245	1.29	202	1.00	145	1.29	202	2.13	551	3.33	1820	1.95	442
21,	3.01	1430	1.69	326	2.70	1060	2.32	692	1.51	264	1.35	218	1.32	210	1.05	152	1.49	257	3.18	1640	3.08	1460	1.88	406
22,	2.81	1200	1.69	326	2.47	834	2.27	652	1.51	264	1.43	239	1.10	160	0.95	138	b2.17	579	2.98	1340	2.73	1110	1.85	392
23,	2.69	1070	1.81	374	2.30	675	2.24	630	2.11	537	1.45	245	1.16	172	0.99	144	2.17	579	2.43	792	2.46	823	1.85	392
24,	2.83	1220	1.86	397	2.20	600	2.12	544	4.13	2900	1.43	239	1.16	172	0.95	138	1.67	320	2.10	530	2.38	743	2.20	600
25,	3.09	1530	1.41	233	2.16	572	2.04	494	3.61	2170	*1.90	415	1.10	160	0.92	133	1.59	292	3.68	2260	2.23	622	2.75	1140
26,	2.91	1310	1.51	264	2.67	1050	1.97	454	3.88	2530	*1.85	392	1.08	157	0.98	142	1.54	274	c5.28	4820	2.18	586	2.95	1860
27,	2.76	1150	1.73	342	a6.57	5390	2.04	494	7.21	9130	1.61	298	1.09	158	0.90	130	1.41	233	5.43	5110	2.13	551	3.05	1480
28,	2.66	1040	2.06	506	5.90	6080	2.10	530	10.01	*17100	1.48	254	1.06	157	0.92	133	1.27	198	4.43	3350	2.16	572	2.80	1190
29,	2.50	865	.....	.....	4.70	3780	3.02	482	7.15	8980	1.45	245	1.16	172	0.90	130	1.29	202	3.33	1820	2.30	675	2.75	1140
30,	2.46	823	.....	.....	3.92	2790	2.10	530	6.28	6910	1.28	188	1.14	168	0.92	133	1.27	198	2.78	1170	2.36	726	2.75	1140
31,	2.59	960	.....	.....	3.52	2060	.....	.....	4.91	4140	.....	.....	1.12	164	0.85	122	.....	.....	2.63	1000	.....	.....	2.60	970

a. Max. 6.52′ at 5 P. M.=7460 sec. ft. b Max. 2.74′ at 5 P. M.=1120 sec. ft. c. Max. 5.88′ at 5 P. M.=6040 sec. ft. d. Max. 7.88′ at 7.30 A. M.=11000 sec. ft.
*Estimated.

DAILY MEAN GAGE HEIGHTS AND DISCHARGE OF RAYSTOWN BRANCH JUNIATA RIVER AT SAXTON, BEDFORD COUNTY, PA.

1914	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G. H	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.
1, ...	2.20	690	6.99	8580	3.19	1650	5.34	4930	3.29	1770	1.36	220	1.42	236	.87	126	.82	118
2, ...	2.18	586	5.20	4660	3.09	1530	4.89	4100	3.03	1460	1.33	212	1.42	236	.89	128	.87	126
3, ...	2.25	638	4.53	3500	2.89	1290	4.69	3760	2.83	1320	1.33	212	1.26	192	.87	126	.87	126
4, ...	2.42	781	3.90	2560	2.89	1290	4.24	3060	2.68	1000	1.43	239	1.35	218	.87	126	.87	126
5, ...	3.00	1420	3.60	2160	2.77	1160	3.84	2480	3.05	1460	1.58	288	1.26	192	.87	126	.92	133
6, ...	2.85	1240	3.52	2060	2.69	1070	3.54	2080	4.90	4120	1.48	254	1.15	170	.87	126	.90	130
7, ...	2.65	1020	3.30	1780	2.69	1070	3.24	1710	4.33	3200	1.36	220	1.12	164	.82	118	.90	130
8, ...	2.52	886	3.22	1680	2.69	1070	3.34	1830	3.88	2630	1.26	195	1.15	170	.82	118	.88	127
9, ...	2.65	1020	2.75	1140	2.64	1010	3.94	2620	4.08	2820	1.18	176	1.17	174	.87	126	.85	122
10, ...	3.35	1840	2.48	844	2.54	907	3.44	1960	4.18	2970	1.20	180	1.12	164	.96	138	.85	122
11, ...	3.90	2560	2.60	970	2.34	709	3.09	1530	3.28	1760	1.22	185	1.15	170	.99	144	.90	130
12, ...	3.72	2320	2.15	565	2.21	608	3.06	1460	3.13	1580	1.18	176	1.12	164	1.07	156	.90	130
13, ...	2.80	1190	1.78	362	2.24	630	2.94	1350	2.96	1370	1.18	176	1.15	170	1.07	156	.90	130
14, ...	*	900	*	300	2.24	630	2.71	1090	2.78	1170	1.16	172	1.25	192	1.09	158	.90	130
15, ...	.....	900	.....	300	2.31	684	2.94	1350	2.58	949	1.06	157	1.89	410	1.02	148	.88	127
16, ...	.....	900	.....	300	5.59	5430	5.96	6210	2.43	792	1.04	157	1.82	379	.97	140	.85	122
17, ...	.....	900	.....	300	6.99	8580	5.14	4550	2.28	645	1.08	150	1.65	312	.92	133	.85	122
18, ...	.....	900	.....	300	8.29	12300	4.25	3080	2.16	572	.96	139	1.32	210	.92	133	.85	122
19, ...	.....	900	.....	300	6.49	7390	3.69	2280	2.06	506	.93	134	1.19	178	.92	133	.90	130
20, ...	.....	900	.....	300	5.29	4840	4.04	2760	1.90	415	.98	142	1.15	170	.87	126	.85	122
21, ...	.....	900	.....	300	4.24	3060	4.89	4100	1.90	415	.98	142	1.05	152	.82	118	.85	122
22, ...	.....	900	.....	300	3.74	2240	4.24	3060	1.80	370	1.13	166	.99	144	.82	118	.85	122
23, ...	.....	900	.....	300	3.49	2020	3.84	2480	1.73	342	1.26	195	.95	138	.87	126	.85	122
24, ...	.....	900	.....	300	3.84	2480	3.49	2020	1.68	323	1.30	205	.92	133	.87	126	.85	122
25, ...	.....	900	.....	300	4.04	2760	3.34	1830	1.66	316	1.48	254	.92	133	.87	126	.90	130
26, ...	.....	900	.....	300	4.89	4100	5.09	4460	1.58	288	1.63	306	.89	128	.87	126	.90	130
27, ...	.....	900	.....	300	5.84	5960	5.29	5080	1.53	288	1.53	270	.87	126	.87	126	.90	130
28, ...	.....	900	.....	300	5.69	5630	4.59	3590	1.58	288	1.48	254	.95	138	.92	133	.90	130
29, ...	.....	900	.....	.....	5.44	5130	3.99	2690	1.66	316	1.46	248	.95	138	.95	138	.90	130
30, ...	6.18	6690	.....	.....	4.74	3340	3.59	2150	1.63	306	1.73	342	.85	122	.89	128	.90	130
31, ...	6.47	7340	.....	.....	5.34	4930	.....	.....	1.50	260	.....	.....	.89	128	.89	128	.....	.....

*River frozen Jan. 14-29 inclusive, Feb. 14-28 inclusive, and discharge estimated from climatological records.

ESTIMATED MONTHLY DISCHARGE OF RAYSTOWN BRANCH JUNIATA RIVER AT SAXTON, BEDFORD COUNTY, PA.

(Drainage Area 790 square miles)

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1911.					
September,	8800	323	1720	2.177	2.429
October,	2260	388	875	1.108	1.278
November,	1020	309	537	0.680	0.759
December,	4500	245	1310	1.658	1.912
a 1912.					
January,	.....	.....	1080	1.367	1.576
February,	10500	.....	1390	1.759	1.897
March,	13500	506	3350	4.241	4.889
April,	4390	586	1690	2.139	2.387
May,	13000	437	2480	3.076	3.546
June,	6040	176	627	0.794	0.886
July,	7440	198	1420	1.797	2.072
August,	615	178	296	0.375	0.432
September,	4410	172	809	1.024	1.142
October,	718	162	306	0.387	0.446
November,	3530	188	448	0.567	0.633
December,	675	160	282	0.357	0.412
The year,	13500	.....	1180	1.490	20.318
1913.					
January,	7820	823	2110	2.671	3.079
February,	1180	233	498	0.630	0.656
March,	7460	402	1220	1.544	1.780
April,	2850	454	969	1.227	1.369
May,	*17100	254	2000	2.532	2.919
June,	2820	138	561	0.710	0.792
July,	668	157	217	0.275	0.317
August,	288	122	157	0.199	0.229
September,	1120	109	216	0.273	0.304
October,	6040	254	1040	1.316	1.517
November,	11000	354	1520	1.924	2.146
December,	2190	392	898	1.137	1.311
The year,	*17100	109	950	1.203	16.420
b 1914.					
January,	7340	586	1440	1.823	2.101
February,	8580	.....	1260	1.595	1.661
March,	12200	608	3100	3.924	4.524
April,	6210	1090	2850	3.608	4.026
May,	4120	260	1160	1.468	1.693
June,	342	134	206	0.261	0.291
July,	410	122	186	0.235	0.271
August,	168	118	132	0.167	0.192
September,	133	118	126	0.159	0.178

a Creek frozen January 6 to February 25 inclusive and discharge estimated from Frankstown Branch Juniata River at Huntingdon.
*Estimated.
b River frozen Feb. 14-28 inclusive and discharge estimated from climatological records.

FRANKSTOWN BRANCH JUNIATA RIVER.

DESCRIPTION OF BASIN.

The Frankstown Branch of the Juniata River drains approximately 995 square miles in Bedford, Blair and Huntingdon counties. Rising in the northern part of Bedford County, this stream flows first in a general northerly direction to Hollidaysburg, thence northeasterly through Blair County to Petersburg, Huntingdon County, where it flows southeasterly to its junction with the Raystown Branch, a total distance of approximately 58 miles, the general outline of the basin being fan shaped. The headwaters lie high up on the Allegheny Mountains, but as the stream descends it enters a fertile, well settled, agricultural valley, through which it flows to Petersburg and thence through a deep gorge, cutting through a succession of ridges to its confluence, six miles below Huntingdon, with the Raystown Branch. The mountains in this basin are well covered with second growth timber, but the valleys are almost deforested. The upper section of the basin contains a limestone formation, from which issue numerous large springs, which materially assists the flow in dry weather. As a whole the watershed is thickly settled, especially along the banks of the river and its principal tributaries, of which Little Juniata is the most important, there being one city, Altoona, and many large industrial boroughs and villages scattered over the area. The river and its tributaries are extensively used for water supply, both domestic and industrial.

The source of the Frankstown Branch lies at an elevation of approximately 1,300 feet and, in a distance of 26 miles to Hollidaysburg, (elevation 930) the fall is at the rate of 20 feet per mile; from this point to Huntingdon (elevation 610) 28 miles further downstream, the slope is 12 feet per mile. The bed is rocky throughout most of its course, with gravel and sand deposits at intervals in the less rapid portions.

A concrete dam 28 feet in height, erected and used for the generation of water power, crosses the river at Warrior Ridge, five miles above Huntingdon, creating slack water for about three miles.

The mean annual precipitation over practically the entire watershed is from 40 to 45 inches.

Discharge has been measured since May 1, 1895, at Huntingdon, six miles above the confluence with the Raystown Branch.

SUSQUEHANNA BASIN—STATION NO. 32.

FRANKSTOWN BRANCH JUNIATA RIVER AT HUNTINGDON, PA.

DESCRIPTION OF STATION.

LOCATION—On county wagon bridge at foot of Fourth Street, Huntingdon, Pa.

RECORDS AVAILABLE—Discharge complete from May 1, 1895, to September 30, 1914.

DRAINAGE AREA—845 square miles.

GAGE—A staff gage is attached to the first pier from the north or Huntingdon side of the bridge. It is a 2x10 inch oak gage, painted white with black graduations in feet and tenths. The elevation of zero is 597.4 feet above sea level. Bench Mark No. 2 is top edge of outer corner of left abutment, downstream side of bridge, elevation 22.50 feet above gage datum. The gage is read thrice daily by Lawrence White.

DISCHARGE MEASUREMENTS—Taken during high water from the steel highway bridge about ¼ mile above gaging station. Low water measurements by wading and at gaging station bridge. The initial point for soundings is end of top angle of handrail, left hand, downstream side.

CHANNEL—The channel above and below the station is straight. The right bank is low and subject to overflow. The left bank is high and not subject to overflow.

REMARKS—Low water readings since the spring of 1908 have been affected by the Pennsylvania Hydro-Electric Co's. plant at Warrior Ridge, 5 miles above Huntingdon, which stores water at intermittent periods.

DISCHARGE MEASUREMENTS OF FRANKSTOWN BRANCH JUNIATA RIVER AT HUNTINGDON, HUNTINGDON COUNTY, PA.

(Drainage area 845 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
28	July 2	Boehringer & Taylor.	234	645	0.69	3.45	446	0.6 msmt.
29	Sept. 4	Taylor & Gough, ...	226	549	0.47	3.52	258	0.6 msmt.

DISCHARGE TABLE FOR FRANKSTOWN BRANCH JUNIATA RIVER AT HUNTINGDON, HUNTINGDON COUNTY, FROM JAN. 1, 1912.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. Ft.	Feet.	Sec. Ft.	Feet.	Sec. Ft.	Feet.	Sec. Ft.	Feet.	Sec. Ft.
2.40	70	.80	1950	.20	6810	.60	13420	12.00	23530
.50	85	.90	2100	.30	7050	.70	13740	.10	24109
.60	100	5.00	2260	.40	7290	.80	14070	.20	24690
.70	125	.10	2430	.50	7540	.90	14410	.30	25300
.80	150	.20	2600	.60	7790	10.00	14750	.40	25930
.90	175	.30	2770	.70	8040	.10	15100	.50	26590
3.00	200	.40	2950	.80	8300	.20	15450	.60	27250
.10	250	.50	3140	.90	8560	.30	15810	.70	27920
.20	300	.60	3330	8.00	8820	.40	16180	.80	28600
.30	350	.70	3520	.10	9090	.50	16560	.90	29290
.40	400	.80	3710	.20	9360	.60	16950	13.00	30000
.50	460	.90	3900	.30	9640	.70	17350	.10	30720
.60	520	6.00	4100	.40	9920	.80	17760	.20	31460
.70	600	.10	4310	.50	10200	.90	18180	.30	32220
.80	700	.20	4520	.60	10480	11.00	18620	.40	33000
.90	800	.30	4730	.70	10760	.10	19070	.50	33800
4.00	900	.40	4950	.80	11040	.20	19530	.60	34600
.10	1010	.50	5170	.90	11320	.30	20000	.70	35400
.20	1120	.60	5400	9.00	11600	.40	20480	.80	36200
.30	1250	.70	5630	.10	11890	.50	20970	.90	370
.40	1380	.80	5860	.20	12180	.60	21460	14.00	37800
.50	1510	.90	6090	.30	12480	.70	21960		
.60	1650	7.00	6330	.40	12790	.80	22470		
.70	1800	.10	6570	.50	13100	.90	22980		

Note: This table is only applicable subsequent to Jan. 1, 1912, and is based on 5 discharge measurements made during 1910-11-12, together with former curve.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF FRANKSTOWN BRANCH JUNIATA RIVER AT HUNTINGDON, HUNTINGDON COUNTY, PA.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	3.27	335	7.50	7540	3.83	730	6.17	4460	4.73	1840	3.40	400	3.47	442	3.23	315	3.60	520
2,	3.57	502	6.27	4670	3.63	544	6.40	4950	4.63	1700	3.73	630	3.42	412	2.83	158	3.57	502
3,	3.47	442	5.73	3580	3.60	520	5.77	3650	4.26	1200	3.50	460	3.43	418	3.70	600	3.27	335
4,	3.70	600	5.47	3060	3.70	600	5.30	2770	4.23	1160	3.53	478	2.90	175	3.47	442	3.35	375
5,	4.10	1010	5.30	2770	3.97	870	5.00	2260	4.68	1770	4.10	1010	3.20	300	3.37	385	3.20	300
6,	3.93	830	4.97	2210	3.70	600	4.83	2000	6.06	4230	3.73	630	3.20	300	3.33	365	2.80	150
7,	3.50	460	4.87	2060	3.57	502	4.73	1840	5.27	2720	2.90	175	3.57	502	3.43	418	3.10	250
8,	3.70	600	4.63	1700	3.43	418	4.70	1800	5.00	2260	3.67	576	3.17	285	3.17	285	3.49	454
9,	3.90	800	4.33	1290	3.57	502	5.07	2380	5.17	2560	3.53	478	3.33	365	2.83	158	3.23	315
10,	4.03	933	4.20	1120	3.60	520	4.63	1760	4.77	1900	3.27	335	3.40	400	3.47	442	3.33	365
11,	4.27	1210	4.23	1160	3.67	576	4.47	1470	4.73	1840	3.70	600	3.27	335	3.50	460	3.00	200
12,	3.93	830	3.73	630	3.63	544	4.17	1090	4.80	1950	3.80	700	3.03	215	3.33	365	3.30	350
13,	4.03	933	3.60	520	3.67	576	4.40	1380	4.80	1950	3.27	335	3.53	478	3.43	418	3.17	285
14,	4.07	977	3.33	360	3.53	730	3.97	870	4.70	1800	2.87	168	3.33	365	3.40	400	3.23	315
15,	4.07	977	3.90	800	4.37	1240	4.17	1090	4.47	1470	3.30	360	3.87	770	3.20	300	3.00	200
16,	4.00	900	4.13	1040	6.83	5930	7.37	7220	4.30	1250	3.20	300	4.53	1550	2.77	142	3.37	385
17,	3.97	870	3.93	830	7.43	7360	5.90	3900	4.07	977	3.30	350	4.00	900	3.33	365	3.27	335
18,	3.70	600	3.93	830	7.93	8640	5.37	2900	4.17	1090	3.37	385	3.77	670	3.30	350	3.03	215
19,	3.63	544	3.90	800	6.43	5020	5.08	2310	4.03	933	3.30	350	3.20	300	3.27	335	3.07	236
20,	3.87	770	4.10	1010	5.57	3270	5.80	3710	4.03	933	3.20	300	3.93	830	3.27	335	3.33	365
21,	3.70	600	4.00	900	5.00	2260	5.77	3650	3.67	576	3.23	315	3.33	365	3.50	460	3.00	200
22,	4.50	1510	3.97	870	4.83	2000	5.37	2900	3.93	830	3.63	544	3.37	385	3.07	235	3.17	286
23,	3.93	830	3.93	830	4.77	1900	5.13	2480	3.87	770	3.53	478	3.27	335	2.83	158	3.03	215
24,	4.17	1090	3.47	442	4.63	1700	4.93	2150	3.63	544	3.23	315	3.63	544	3.70	600	3.00	200
25,	4.23	1160	3.73	630	4.70	1800	4.77	1900	3.80	700	3.60	520	3.27	335	3.57	502	2.93	182
26,	4.65	1720	3.67	576	5.73	3580	7.13	6640	3.83	730	3.53	478	2.70	125	3.40	400	3.03	215
27,	4.20	1120	3.90	800	6.97	6260	6.03	4160	3.77	670	3.57	502	3.50	460	3.00	200	3.03	215
28,	4.33	1290	3.73	630	8.20	9360	5.50	3140	3.70	600	3.43	418	3.30	350	3.23	315	3.03	215
29,	6.05	4200	.....	.....	7.40	7290	5.13	2480	3.90	800	3.63	544	3.33	365	3.33	365	3.03	215
30,	6.70	5630	.....	.....	7.00	6330	4.98	2230	3.60	520	3.30	350	3.33	365	2.80	150	2.87	168
31,	7.18	6760	.....	.....	6.83	5980	.....	.....	3.00	200	.....	.....	3.37	385	3.47	442	.....	.....

ESTIMATED MONTHLY DISCHARGE OF FRANKSTOWN BRANCH JUNIATA RIVER AT HUNTINGDON, HUNTINGDON COUNTY.

(Drainage area 845 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	6760	335	1220	1.563	1.801
February,	7540	360	1560	1.846	1.922
March,	9360	418	2840	3.361	3.875
April,	6640	870	2850	3.373	3.763
May,	4230	200	1370	1.621	1.869
June,	1010	168	449	0.531	0.592
July,	1550	125	452	0.535	0.617
August,	600	142	350	0.414	0.477
September,	520	150	285	0.337	0.376

KISHACOQUILLAS CREEK.

DESCRIPTION OF BASIN.

Kishacoquillas Creek joins the Juniata River at Lewistown, 45 miles above the river's mouth, from the northeast, draining 195 square miles, practically all of which lies in Mifflin County. It is formed by the East and West branches which join at Reedville, both branches and its other tributaries rising in the sandstone ridges, while the main stream valley and those of the two branches for some miles above their junction lie in the limestone belt resulting in a well maintained flow. Its course is southwesterly and its length from Reedville is five and one-half miles, the basin being fan shaped. The main valley is densely populated and water is used for industrial, domestic and water power purposes. Its larger upper tributaries as they emerge from the sandstone area are used for supplying Reedville, Burnham, Yeagertown and Lewistown.

The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge has been measured since August 21, 1911, at Kulp's, two miles above the mouth.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF KISHACOQUILLAS CREEK AT KULPS, MIFFLIN COUNTY, PA.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	1.38	215	3.02	1430	1.28	164	2.77	1160	2.08	557	1.40	222	1.04	110	0.78	50	0.77	48
2,	1.36	208	2.80	1190	1.16	143	2.83	1220	2.00	504	1.39	219	1.08	121	0.98	95	0.80	54
3,	1.41	226	2.58	963	1.23	164	2.56	944	1.92	456	1.36	208	1.07	118	1.00	100	0.72	38
4,	1.91	450	2.39	787	1.22	161	2.38	779	1.88	433	1.36	208	1.02	105	0.89	74	0.71	36
5,	1.68	333	2.26	684	1.20	154	2.26	684	2.30	714	1.34	202	1.08	121	1.04	110	1.04	110
6,	1.60	298	2.11	577	1.24	168	2.14	598	2.18	626	1.32	195	1.00	100	1.09	123	0.79	52
7,	1.58	290	2.06	544	1.20	154	2.09	563	2.03	524	1.26	174	0.88	72	0.92	81	0.71	36
8,	1.56	283	1.94	468	1.18	148	2.25	677	2.04	530	1.25	171	0.98	95	0.93	83	0.72	38
9,	1.52	268	1.78	380	1.18	148	2.24	746	3.00	1410	1.20	154	0.95	88	1.30	188	0.70	34
10,	1.56	283	1.64	316	1.18	148	2.18	626	2.60	982	1.18	148	0.72	38	1.10	126	0.71	36
11,	1.48	252	1.69	338	1.19	151	2.11	577	2.41	804	1.14	137	0.76	46	1.01	103	0.72	38
12,	1.46	245	1.58	290	1.18	148	2.05	537	2.48	868	1.16	143	0.88	72	0.96	95	0.87	69
13,	1.49	256	1.54	275	1.20	154	1.96	480	2.60	982	1.12	132	0.92	81	0.96	90	0.96	90
14,	1.48	252	1.60	298	1.30	188	1.87	423	2.40	795	1.12	132	0.74	42	0.78	50	0.71	36
15,	1.37	212	1.51	264	1.75	386	2.07	550	2.32	730	1.10	126	0.75	44	0.92	81	0.88	72
16,	1.42	230	1.53	271	2.20	640	2.68	1060	2.24	670	1.06	116	1.06	116	0.72	38	0.87	69
17,	1.44	237	1.54	275	2.72	1100	2.38	779	2.15	605	0.96	90	1.24	168	0.78	50	0.96	90
18,	1.36	208	1.47	249	3.22	1680	2.24	670	1.99	498	1.04	110	1.10	126	0.86	67	0.96	90
19,	1.34	202	1.50	260	2.63	1060	2.22	655	1.90	444	1.10	126	1.04	110	0.96	90	0.70	34
20,	1.34	202	1.45	241	2.38	779	3.45	1980	1.80	390	1.08	121	0.86	67	1.08	108	0.72	38
21,	1.38	215	1.36	208	2.23	699	†3.40	1920	1.78	380	1.02	105	1.07	118	1.04	110	0.88	72
22,	1.35	205	1.28	181	2.08	557	3.07	1490	1.74	361	1.45	241	0.89	74	1.02	105	0.86	67
23,	1.30	188	1.35	205	2.04	530	2.74	1130	1.68	333	1.25	171	0.88	72	0.93	83	0.93	83
24,	1.28	181	1.34	202	1.96	480	2.50	886	1.66	324	1.09	123	0.96	90	0.72	38	0.96	90
25,	1.48	252	1.30	188	2.06	544	2.36	763	1.62	307	1.11	129	1.12	182	0.78	50	0.84	63
26,	1.41	226	1.26	174	2.62	1000	2.80	1190	1.56	283	1.10	126	0.84	63	0.70	34	0.86	67
27,	1.39	219	1.28	181	3.38	1900	2.50	886	1.53	271	1.06	116	0.71	36	0.83	61	0.66	27
28,	1.44	237	1.23	164	4.40	3200	2.41	804	1.50	260	1.18	148	1.20	161	0.72	38	0.82	58
29,	1.66	324	.....	.....	3.88	2540	2.32	730	1.46	245	1.18	148	1.15	140	0.82	58	0.86	67
30,	2.05	537	.....	.....	3.50	2040	2.20	640	1.46	245	1.05	113	0.94	86	0.99	98	0.94	86
31,	*2.72	1100	.....	.....	3.08	1510	.....	.....	1.44	237	.....	.....	0.70	34	0.78	50	.....	.....

*Max. 3.10 at 4.20 p. m.=1530 sec. ft. †Max. 3.80 at 6.0[illegible] p. m.=2430 sec. ft.

ESTIMATED MONTHLY DISCHARGE OF KISHACOQUILLAS CREEK AT KULPS, MIFFLIN COUNTY, PA.

(Drainage area 190 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	1530	181	285	1.500	1.729
February,	1420	164	414	2.179	2.269
March,	3200	143	736	3.874	4.466
April,	2430	423	872	4.589	5.120
May,	1410	237	541	2.847	3.282
June,	241	90	152	0.800	0.893
July,	163	84	92	0.484	0.558
August,	126	84	82	0.431	0.497
September,	110	27	60	0.316	0.353

TUSCARORA CREEK.

DESCRIPTION OF BASIN.

Tuscarora Creek, an important tributary of the Juniata River, joining that stream at Port Royal, from the south, rises in the southeastern part of Huntingdon County and flows northeasterly through that county into Juniata County and thence in the same direction to the river. It total length is approximately 45 miles and its total drainage area approximately 256 square miles, its watershed being long, straight and narrow. The only large tributary is Licking Creek which, after flowing nearly parallel to the parent stream for several miles, joins it just above the river. Licking Creek is used for industrial water supply. The valley is well cultivated as are some of the hillsides, while the hill tops are well timbered. The main stream is unused for water supply and little for power.

The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge has been measured since August 21, 1911, at Groninger's Bridge, four miles above the mouth.

SUSQUEHANNA BASIN—STATION NO. 34.

TUSCARORA CREEK NEAR PORT ROYAL, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, steel, through-truss, highway bridge, about 2 miles above Port Royal, Juniata County.

RECORDS AVAILABLE—Discharge complete from August 21, 1911, to September 30, 1914.

DRAINAGE AREA—205 square miles.

GAGE—A chain gage is bolted to the floor, upstream side. The length of chain from the bottom of the weight to the marker is 21.66 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is shelf in stone on face of right abutment, seventh course from top, second in from downstream corner, 0.54 feet down from top of stone, elevation 9.71 feet above gage datum. The gage is read twice daily by G. W. Groninger.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge and by wading 100 feet upstream during low stages. The initial point for soundings is bridge pin, downstream right abutment.

CHANNEL—The channel above the station is straight for 150 feet then bends to the left. Below the station it is straight for 200 feet. Both banks are low, but not subject to overflow except during extreme high stages. The bed is composed of gravel and rocks.

DISCHARGE MEASUREMENTS OF TUSCARORA CREEK NEAR PORT ROYAL, JUNIATA COUNTY, PA.

(Drainage area 205 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
15	1914 Sept. 16	Taylor & Gough, ...	62	61	0.20	2.14	12	Wading msmt.

DISCHARGE TABLE FOR TUSCARORA CREEK NEAR PORT ROYAL, JUNIATA COUNTY, FROM JAN. 1, 1913.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. Ft.	Feet.	Sec. Ft.	Feet.	Sec. Ft.	Feet.	Sec. Ft.	Feet.	Sec. Ft.
2.00	3	.70	315	.40	1210	.10	2575	.80	4340
.10	10	.80	350	.50	1275	.20	2665	.90	4460
.20	20	.90	385	.60	1345	.30	2755	9.00	4580
.30	32	4.00	425	.70	1415	.40	2850	.10	4700
.40	44	.10	465	.80	1490	.50	2950	.20	4820
.50	57	.20	510	.90	1565	.60	3050	.30	4945
.60	70	.30	560	6.00	1640	.70	3150	.40	5080
.70	85	.40	615	.10	1715	.80	3250	.50	5215
.80	100	.50	670	.20	1790	.90	3350	.60	5350
.90	120	.60	725	.30	1870	8.00	3456	.70	5485
3.00	140	.70	780	.40	1950	.10	3560	.80	5625
.10	160	.80	835	.50	2035	.20	3665	.90	6765
.20	180	.90	890	.60	2125	.30	3775	10.00	5905
.30	205	5.00	950	.70	2215	.40	3885		
.40	230	.10	1015	.80	2305	.50	3995		
.50	255	.20	1080	.90	2395	.60	4110		
.60	285	.30	1145	7.00	2485	.70	4225		

Note: This table is only applicable subsequent to Jan. 1, 1913, and is based on 4 discharge measurements made during 1912 and 1913, together with the former curve above gage height 4.1 ft.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF TUSCARORA CREEK NEAR PORT ROYAL JUNIATA COUNTY, PA.

1911.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	3.06	152	‡7.70	3150	.....	170	4.81	840	3.92	393	2.68	82	2.36	39	2.28	30	2.28	30
2,	3.12	164	5.96	1610	.....	170	4.88	879	3.77	340	2.72	88	2.34	37	2.05	6	2.18	18
3,	3.16	172	5 26	1120	.....	170	4.48	659	3.58	279	2.73	90	2.41	45	2.39	43	2.15	15
4,	4.34	582	4.31	840	.....	170	4.15	488	3.49	252	2.72	88	2.45	50	2.41	45	2.14	14
5,	4.61	730	4.66	758	.....	170	3.98	417	3.91	389	3.11	162	2.31	33	2.31	33	2.13	13
6,	4.31	566	4.38	604	.....	170	3.82	357	4.75	808	2.77	96	2.36	39	2.30	32	1.95	2
7,	4.21	515	4.21	515	.....	170	3.70	315	4.28	525	2.65	78	2.43	48	2.19	19	2.14	14
8,	4.11	470	4.04	441	.....	170	3.87	374	4.12	474	2.63	74	2.31	33	2.25	26	2.21	21
9,	3.86	371	3.51	258	.....	170	4.52	681	6.69	2210	2.55	64	2.36	39	2.08	5	2.13	13
10,	3.94	401	3.34	215	.....	170	3.92	393	5.73	1440	2.55	64	2.35	38	2.26	27	2.09	9
11,	3.92	393	3.54	267	.....	170	3.85	366	4.93	908	2.59	69	2.29	31	2.29	31	2.09	9
12,	3.66	303	*	200	.....	170	3.78	343	4.57	708	2.51	58	2.34	37	2.79	98	2.08	9
13,	*	215	.....	200	.....	170	3.57	276	4.79	830	2.46	52	2.39	43	2.43	48	2.03	5
14,	.....	215	.....	200	.....	170	3.42	235	4.25	535	2.45	50	2.59	69	2.55	64	2.09	9
15,	.....	215	.....	200	.....	170	3.84	364	3.97	413	2.47	53	2.61	72	2.36	38	2.19	19
16,	.....	215	.....	200	.....	170	§7.22	2680	3.75	332	2.35	38	2.72	88	2.27	28	2.12	12
17,	.....	215	.....	200	6.41	1960	5.32	1160	3.60	285	2.43	48	2.93	126	2.25	26	2.02	4
18,	.....	215	.....	200	7.48	2980	4.62	736	3.45	242	2.33	36	2.65	78	2.35	38	2.01	4
19,	.....	215	.....	200	6.36	1920	4.24	530	3.41	232	2.41	45	2.46	52	2.27	28	2.00	3
20,	.....	215	.....	200	5.01	956	4.68	769	3.25	192	2.37	40	2.42	47	2.25	26	2.05	6
21,	.....	215	.....	200	4.43	632	5.15	1050	3.19	178	2.47	53	2.15	15	2.24	25	1.91	1
22,	.....	215	.....	200	4.24	530	4.64	747	3.12	164	2.58	67	2.37	40	2.22	22	2.09	9
23,	.....	215	.....	200	4.21	515	4.32	571	3.07	154	2.57	66	2.31	33	2.13	13	2.06	7
24,	.....	215	.....	200	4.18	501	3.94	401	3.02	144	2.49	56	2.22	22	2.19	19	2.08	9
25,	4.39	610	.....	200	4.46	648	3.92	393	2.95	130	2.42	47	2.23	24	2.23	24	2.14	14
26,	4.28	550	.....	200	5.66	1390	7.17	2640	2.92	124	2.42	47	2.09	9	2.15	15	2.11	11
27,	3.94	401	.....	208	6.28	1850	5.66	1390	2.83	106	2.38	42	2.26	27	2.11	11	2.07	8
28,	4.08	457	.....	200	7.06	2540	4.58	879	3.73	326	2.56	65	2.27	28	2.15	15	2.15	15
29,	4.24	580	.....	.....	6.29	1860	4.46	648	3.01	142	2.92	124	2.25	26	2.25	26	2.14	14
30,	5.36	1180	.....	.....	5.58	1330	4.22	520	2.93	126	2.51	58	2.29	31	2.19	19	2.06	9
31,	†7.34	2790	.....	.....	5.18	1070	.....	.....	2.71	86	.....	.....	2.29	31	2.28	30	.....	.....

*Creek frozen Jan. 13-24 inclusive; Feb. 12-March 16 inclusive and discharge estimated from Kishacoquillas Creek at Kulps. †Max. 8.11 at 4 p. m.; 3670 sec. ft. ‡Max. 8.22 at 8:15 a. m.; 3690 sec. ft. §Max. 7.96 at 7 a. m.; 3410 sec. ft.

ESTIMATED MONTHLY DISCHARGE OF TUSCARORA CREEK NEAR PORT ROYAL, JUNIATA COUNTY, PA.

(Drainage area 205 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	3570	.....	449	2.190	2.525
February,	3690	.....	471	2.298	2.393
March,	2980	.....	753	3.673	4.235
April,	3410	236	727	3.595	4.011
May,	2210	86	434	2.117	2.441
June,	162	36	67	0.327	0.365
July,	126	9	43	0.210	0.242
August,	96	5	29	0.141	0.162
September,	30	1	11	0.054	0.060

Note: Creek frozen Jan. 13-24 inclusive; Feb. 12-March 16 inclusive; and discharge estimated from Kishacoquillas Creek at Kulps.

JUNIATA RIVER.

DESCRIPTION OF BASIN.

The Juniata River, the largest tributary of the Susquehanna River below the forks, drains a crescent shaped area of approximately 3,450 square miles, lying in the southcentral part of Pennsylvania and entirely within the Allegheny Mountains and their foot hills. This river is formed in Huntingdon County at a point six miles east of Huntingdon by the junction of the Raystown and Frankstown branches, the former rising on the eastern slope of the mountains in the eastern part of Somerset County, flowing eastward and then northeastward, with a drainage area of approximately 1,012 square miles, and the latter rising in the northwestern part of Bedford County on the eastern slope of the Allegheny Divide, and flowing northeasterly and then southeasterly with a drainage area of approximately 995 square miles.

From the junction of the two branches, the Juniata River flows in a general easterly direction through Huntingdon, Mifflin, Juniata and Perry counties to its mouth at Juniata Bridge, a total distance of about 80 miles. The valley of the stream is narrow, bounded by high bordering hills, and flows in a winding course cutting through a succession of sandstone ridges, the channel being generally on a rocky bed, with numerous riffles separated by pools, in which sediment

to considerable depth has collected at some points. The junction of the Frankstown and Raystown branches lies at an approximate elevation of 610 feet and the mouth at 360 feet, making an average fall of three feet per mile. Draining, as this stream does, a section of the Allegheny Mountains, it has many tributaries flowing northerly and southerly between the ridges. The mountains are generally covered with second growth timber but the larger valleys are deforested and used extensively for farming. The valleys of the river and its main tributaries are rather thickly populated, but the headwaters of the tributaries are sparsely inhabited. At one time this river was followed from its mouth to Hollidaysburg by the Pennsylvania Canal, long since abandoned and replaced by the main line of the Pennsylvania Railroad.

The majority of the larger towns receive their domestic water supply from tributaries of the river; the river itself, being thus used only in case of emergency is, however, considerably employed for industrial purposes. Several of the lower tributaries, as well as both of the branches, drain areas of limestone which contribute to maintain a fair low water flow.

The mean annual precipitation over almost the entire basin is from 40 to 45 inches.

The discharge has been measured since March 21, 1899, at Newport, twelve miles above the mouth.

SUSQUEHANNA BASIN—STATION NO. 35.

JUNIATA RIVER AT NEWPORT, PA.

DESCRIPTION OF STATION.

LOCATION—On steel, through-truss, highway bridge, 800 feet east of public square at Newport, Perry County.

RECORDS AVAILABLE—Discharge complete from March 21, 1899, to July 14, 1906, and from January 7, 1907, to September 30, 1914.

DRAINAGE AREA—3,380 square miles.

GAGE—A standard chain gage is fastened to the downstream handrail near the right bank. The length of chain from the bottom of the weight to the marker it 36.91 feet. The elevation of

zero is 363.32 feet above mean sea level. Bench Mark No. 1 has been destroyed. Bench Mark No. 2 is on shelf in southeast corner of underpinning of store of J. M. Ewing, elevation 28.87 feet above gage datum. Bench Mark No. 3 is top of fire plug in front of Ewing's store, elevation 29.75 feet above gage datum. Bench Mark No. 4 is top of outer upstream corner of concrete pier 150 feet above bridge, elevation 11.28 feet above gage datum. The gage is read twice daily by G. A. Sweger.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is end of hand-rail on right bank.

CHANNEL—The channel is straight for ½ mile above and below the bridge. Both banks are high and not subject to overflow. The bed is composed of hard material. There is a good measurable velocity at all stages.

DISCHARGE MEASUREMENTS OF JUNIATA RIVER AT NEWPORT, PERRY COUNTY, PA.

(Drainage area 3,380 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
39	Mar. 18	Brown, ...	619	6619	5.35	12.68	35416	Surf. msmt.
40	July 2	Boehringer & Taylor.	517	1094	1.65	3.66	1802	0.6 msmt.
41	Sept. 16	Taylor & Gough, ...	456	660	0.76	2.92	500	0.6 msmt.

DISCHARGE TABLE FOR JUNIATA RIVER AT NEWPORT, PERRY COUNTY, FROM JAN. 1, 1914.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. Ft.	Feet.	Sec. Ft.	Feet.	Sec. Ft.	Feet.	Sec. Ft.	Feet.	Sec. Ft.
0.60	420	.60	10800	.60	26780	.60	46540	.60	70120
.70	490	.70	11160	.70	27220	.70	47100	.70	70740
.80	565	.80	11520	.80	27660	.80	47660	.80	71360
.90	655	.90	11880	.90	28100	.90	48220	.90	71980
3.00	760	7.00	12240	11.00	28540	15.00	48780	19.00	72600
.10	875	.10	12600	.10	28980	.10	49340	.10	73220
.20	1010	.20	12960	.20	29420	.20	49900	.20	73840
.30	1155	.30	13330	.30	29880	.30	50460	.30	74460
.40	1320	.40	13700	.40	30340	.40	51040	.40	75080
.50	1500	.50	14070	.50	30800	.50	51620	.50	75700
.60	1695	.60	14440	.60	31260	.60	52200	.60	76320
.70	1910	.70	14820	.70	31720	.70	52780	.70	76940
.80	2140	.80	15200	.80	32180	.80	53360	.80	77560
.90	2380	.90	15580	.90	32640	.90	53940	.90	78180
4.00	2630	8.00	15960	12.00	33100	16.00	54520	20.00	78800
.10	2900	.10	16350	.10	33580	.10	55100	.10	79420
.20	3170	.20	16740	.20	34060	.20	55680	.20	80060
.30	3440	.30	17130	.30	34540	.30	56260	.30	80700
.40	3710	.40	17520	.40	35020	.40	56840	.40	81340
.50	3990	.50	17920	.50	35500	.50	57440	.50	81980
.60	4270	.60	18320	.60	36000	.60	58040	.60	82620
.70	4550	.70	18720	.70	36500	.70	58640	.70	83260
.80	4830	.80	19120	.80	37000	.80	59240	.80	83900
.90	5130	.90	19520	.90	37500	.90	59840	.90	84540
5.00	5440	9.00	19940	13.00	38020	17.00	60440	21.00	85180
.10	5750	.10	20360	.10	38540	.10	61040	.10	85820
.20	6060	.20	20780	.20	39060	.20	61640	.20	86460
.30	6380	.30	21200	.30	39580	.30	62240	.30	87100
.40	6700	.40	21620	.40	40100	.40	62840	.40	87740
.50	7020	.50	22040	.50	40620	.50	63440	.50	88380
.60	7350	.60	22460	.60	41140	.60	64040	.60	89020
.70	7680	.70	22880	.70	41660	.70	64640	.70	89660
.80	8010	.80	23300	.80	42200	.80	65240	.80	90300
.90	8340	.90	23720	.90	42740	.90	65840	.90	90940
6.00	8680	10.00	24140	14.00	43280	18.00	66440	22.00	91580
.10	9020	.10	24580	.10	43820	.10	67040	.10	92220
.20	9370	.20	25020	.20	44360	.20	67640	.20	92860
.30	9720	.30	25460	.30	44900	.30	68260		
.40	10080	.40	25900	.40	45440	.40	68880		
.50	10440	.50	26340	.50	45980	.50	69500		

Note: This table is only applicable subsequent to Jan. 1, 1914, and is based on 2 discharge measurements made during 1914, together with former curve.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF JUNIATA RIVER AT NEWPORT, PERRY COUNTY, PA.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	4.24	3280	†13.50	40600	.....	2000	8.25	16900	5.93	8440	3.78	2090	3.68	1870	3.15	942	3.14	929
2,	4.14	3010	10.88	28000	.....	2000	7.91	15600	5.57	7250	3.62	1740	3.65	1800	3.14	929	2.94	697
3,	4.11	2980	8.67	18600	.....	2000	7.67	14700	5.25	6220	3.65	1800	3.53	1560	3.17	970	3.27	1110
4,	5.31	6410	7.88	13600	.....*	2000	7.07	12500	5.03	5530	3.67	1850	3.41	1340	3.23	1050	3.17	970
5,	5.49	6990	6.85	11700	.....	2000	6.47	10300	5.32	6440	3.65	1800	3.39	1300	3.25	1080	3.02	783
6,	5.27	6280	6.29	9680	.....	2000	6.08	8950	5.92	8410	3.79	2120	3.23	1050	3.19	996	2.96	719
7,	5.09	5720	5.94	8480	.....	2000	5.65	7520	6.93	12000	3.77	2070	3.37	1270	3.16	956	2.84	601
8,	4.81	4860	5.63	7610	.....	2000	5.58	7280	6.47	10900	3.67	1850	3.33	1200	3.84	2240	2.84	601
9,	4.69	4520	5.22	6120	.....	2000	6.23	9650	8.03	16100	3.48	1460	3.41	1340	3.49	1480	2.85	610
10,	4.73	4630	5.24	6190	.....	2000	6.25	9540	7.39	13700	3.57	1640	3.23	1050	3.24	1070	2.82	593
11,	4.94	5250	4.80	4830	.....	2000	5.47	6920	6.53	10500	3.51	1520	3.56	1620	3.25	1080	2.97	728
12,	5.20	6060	4.52	4050	.....	2000	5.31	8040	6.35	9900	3.38	1290	3.26	1100	3.19	996	2.90	665
13,	4.91	5160	4.25	3300	.....	2000	5.53	7120	6.38	9940	3.41	1340	3.31	1170	3.45	1410	2.98	739
14,	4.24	3280	3.88	2330	.....	2000	5.12	5810	5.90	8340	3.42	1360	3.48	1460	3.30	1160	2.88	637
15,	3.97	2560	4.07	2820	.....	9000	4.98	5380	5.50	7020	3.30	1160	3.52	1540	3.24	1070	2.93	686
16,	4.17	3090	*	2500	.....	9000	7.78	15100	5.23	6160	3.25	1080	3.41	1340	3.22	1040	2.92	676
17,	4.49	3960	.....	2500	9.70	22900	9.23	20900	4.95	5280	3.27	1110	3.96	2530	3.16	956	2.92	676
18,	4.74	4660	.....	2500	12.50	35500	7.85	15400	4.77	4750	3.24	1070	3.92	2430	3.21	1020	2.90	655
19,	4.47	3910	.....	2500	11.99	33100	6.83	11600	4.67	4470	3.32	1190	3.72	1960	3.13	916	2.94	697
20,	4.30	3440	.....	2500	9.30	21200	6.78	11400	4.51	4020	3.23	1050	3.56	1620	3.16	956	2.86	619
21,	4.31	3470	.....	2500	7.44	13800	8.21	16800	4.35	3580	3.25	1080	3.35	1240	3.15	942	2.86	619
22,	4.54	4100	.....	2500	6.44	10200	7.98	15900	4.23	3250	3.62	1740	3.47	1460	3.51	1520	2.86	619
23,	4.94	5250	.....	2500	6.40	10100	7.04	12400	4.37	3630	3.55	1600	3.31	1170	3.14	929	2.90	655
24,	5.04	5560	.....	2500	5.80	8010	6.42	10200	4.00	2690	3.46	1410	3.24	1070	3.30	1160	2.90	655
25,	5.20	6060	.....	2500	5.72	7750	5.98	8610	3.97	2560	3.65	1800	3.18	983	3.02	783	2.94	697
26,	5.65	7520	.....	2500	6.28	9650	7.87	15500	3.95	2560	3.42	1360	3.30	1160	2.94	697	2.93	686
27,	5.80	8010	.....	2500	8.47	17800	9.21	20800	3.87	2310	3.41	1340	3.18	983	3.49	1480	2.92	676
28,	5.67	7580	.....	2500	10.76	27500	8.23	16900	3.83	2210	3.45	1410	3.39	1300	3.39	1300	2.89	646
29,	5.54	7150	.....	.....	11.77	32000	7.10	12600	3.89	2360	3.67	1850	3.22	1040	3.84	2240	2.84	601
30,	7.61	14500	.....	.....	9.62	22500	6.49	10400	3.85	2260	3.65	1800	3.35	1240	3.16	956	2.89	646
31,	†10.61	26800	.....	.....	8.90	19500	.....	.....	3.75	2020	.....	.....	3.19	996	3.69	1890	.....	.....

*River frozen Feb. 16-March 16 inclusive and discharge estimated from Frankstown Branch Juniata River at Huntingdon. †Max. 11.99 at 5 p. m.; 33100 sec. ft. ‡Max. 13.80 at 5 p. m.; 42200 sec. ft.

ESTIMATED MONTHLY DISCHARGE OF JUNIATA RIVER AT NEWPORT, PERRY COUNTY, PA.

(Drainage area 3,380 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	33100	2560	6000	1.775	2.046
February,	42200	.....	7160	2.118	2.206
March,	35500	.....	10900	3.225	3.718
April,	20900	5380	12000	3.550	3.961
May,	16100	2020	6260	1.852	2.135
June,	2120	1050	1530	0.453	0.505
July,	2530	983	1390	0.411	0.474
August,	2240	697	1170	0.346	0.399
September,	1110	583	696	0.206	0.230

River frozen Feb. 16-March 16 inclusive, and discharge estimated from Frankstown Branch Juniata River at Huntingdon.

CONODOGUINET CREEK.

DESCRIPTION OF BASIN.

Conodoguinet Creek rises in the highlands of the west part of Franklin County and flows northeast through Franklin and Cumberland counties to join the Susquehanna River opposite Harrisburg. Its course is tortuous, its current slow and its valley in the lower section is deep and narrow. The total length of the creek is 75 miles and its drainage area 483 square miles. Its tributaries are generally short and unimportant, its watershed being long and narrow. On the north the basin is bounded by a sandstone ridge, while to the south the valley is composed of rolling, limestone hills, highly cultivated. Carlisle and Mechanicsburg, and other smaller boroughs, lie in the valley of the stream; the former obtaining its water supply therefrom, and other towns receiving their supply from the tributaries. It is considerably used for water power by grist mills and a few small hydro-electric plants.

The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge has been measured since September 26, 1911, at Bryson's Bridge, 15 miles above the mouth.

SUSQUEHANNA BASIN—STATION NO. 36.

CONODOGUINET CREEK AT BRYSON'S BRIDGE, PA.

DESCRIPTION OF STATION.

LOCATION—On two span, wooden covered bridge, 500 feet below Spangler's mill, near Hogestown, Cumberland County.

RECORDS AVAILABLE—Discharge complete from September 26, 1911, to September 30, 1914.

DRAINAGE AREA—460 square miles.

GAGE—A sectional chain gage is fastened on the downstream chord of the bridge. The length of chain from the bottom of the weight to the marker is 19.03 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is corner of protruding stone, third dowr from top, at bridge end of left downstream approach wall, elevation 20.70 feet above gage datum. The gage is read twice daily by Robert D. Hoy.

DISCHARGE MEASUREMENTS—Taken from the bridge through the floor openings on the downstream side, or by wading at bridge section. The initial point for soundings is top edge of left abutment, downstream side.

CHANNEL—The channel is straight above and below the station. The right bank is fairly high, while the left bank is low, but all water passes under the bridge at high stages. The bed is composed of rocks, gravel and sand.

REMARKS—Silver Spring Creek enters the creek about 500 feet above the bridge.

DISCHARGE MEASUREMENTS OF CONODOGUINET CREEK AT BRYSON'S BRIDGE, CUMBERLAND COUNTY, PA.

(Drainage area 460 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity	Gage height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
	1914							
23	Sept. 15	Taylor & Gough, ...	222	379	0.50	3.31	189	Wading msmt.

DISCHARGE TABLE FOR CONODOGUINET CREEK AT BRYSON'S BRIDGE, CUMBERLAND COUNTY, FROM JAN. 1, 1912.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. Ft.	Feet.	Sec. Ft.	Feet.	Sec. Ft.	Feet.	Sec. Ft.	Feet.	Sec. Ft.
2.60	127	.10	770	.60	1770	.10	3160	.60	5210
.70	155	.20	830	.70	1850	.20	3270	.70	5370
.80	185	.30	890	.80	1930	.30	3390	.80	5540
.90	217	.40	950	.90	2010	.40	3510	.90	5710
3.00	251	.50	1010	6.00	2090	.50	3640	9.00	5880
.10	287	.60	1070	.10	2170	.60	3770	.10	6060
.20	325	.70	1130	.20	2260	.70	3900	.20	6240
.30	365	.80	1200	.30	2350	.80	4030	.30	6420
.40	405	.90	1270	.40	2450	.90	4160	.40	6610
.50	450	5.00	1340	.50	2550	8.00	4300	.50	6800
.60	495	.10	1410	.60	2650	.10	4450	.60	7000
.70	545	.20	1480	.70	2750	.20	4600	.70	7200
.80	600	.30	1550	.80	2850	.30	4750	.80	7410
.90	655	.40	1620	.90	2950	.40	4900	.90	7630
4.00	710	.50	1690	7.00	3050	.50	5050	10.00	7850

Note:—This table is applicable subsequent to Jan. 1, 1912, except from June 1 to Nov. 30, 1913, and June 1 to Nov. 30, 1914, when the discharge table for grass conditions applies, and is based on two low water discharge measurements, together with former curve.

DISCHARGE TABLE FOR GRASS CONDITIONS FOR CONODOGUINET CREEK AT BRYSON'S BRIDGE, CUMBERLAND COUNTY, FROM JUNE 1, 1913, TO DEC. 1, 1913, AND FROM JUNE 1, 1914 TO DEC. 1, 1914.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Discharge.	Gage height.
Feet.	Sec. Ft.	Feet.	Sec. Ft.	Feet.	Sec. Ft.	Feet.	Sec. Ft.	Feet.	Sec. Ft.
2.60	95	.70	445	.80	1100	.90	1950	7.00	3050
.70	118	.80	490	.90	1170	6.00	2050	.10	3160
.80	143	.90	540	5.00	1240	.10	2150	.20	3270
.90	168	4.00	595	.10	1310	.20	2250	.30	3390
3.00	195	.10	650	.20	1380	.30	2350	.40	3510
.10	225	.20	705	.30	1455	.40	2450	.50	3640
.20	255	.30	765	.40	1535	.50	2550	.60	3770
.30	290	.40	830	.50	1615	.60	2650	.70	3900
.40	325	.50	895	.60	1695	.70	2750	.80	4030
.50	360	.60	960	.70	1775	.80	2850	.90	4160
.60	400	.70	1030	.80	1860	.90	2950	8.00	4300

Note: This table is applicable from June 1 to Nov. 30, 1913, and from June 1 to Nov. 30, 1914, when grass conditions existed, and is based on six discharge measurements, together with former curve.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF CONODOGUINET CREEK AT BRYSON'S BRIDGE, CUMBERLAND COUNTY, PA.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1.	3.63	510	7.89	4150	.....	325	4.48	998	4.36	926	3.36	311	3.54	376	3.43	336	3.54	376
2.	3.53	464	6.32	2870	.....	325	4.62	1080	4.16	806	3.44	339	3.54	376	3.33	300	3.49	356
3.	3.33	377	5.39	1610	.....	325	4.40	950	4.06	746	3.44	339	3.58	392	3.61	404	3.34	304
4.	5.95	2050	5.02	1350	.....	325	4.25	860	3.78	589	3.44	339	3.51	364	3.68	436	3.39	322
5.	6.87	2920	4.76	1170	.....	325	4.02	722	4.26	866	3.54	376	3.46	346	3.41	328	3.29	286
6.	6.10	2170	4.52	1020	.....	325	3.88	644	5.63	1790	3.48	353	3.46	346	3.41	328	3.33	297
7.	5.25	1520	4.49	1000	.....	325	3.85	628	4.98	1330	3.51	364	3.51	364	3.35	308	3.39	322
8.	4.73	1150	4.62	1080	.....	325	4.15	800	4.60	1070	3.41	328	3.48	353	3.35	308	3.26	276
9.	4.53	1030	3.99	705	3.62	505	5.60	1770	6.96	3010	3.46	346	3.46	346	3.28	283	3.36	311
10.	4.25	860	4.06	746	3.32	373	5.08	1400	6.08	2150	3.38	318	3.51	364	3.45	342	3.26	276
11.	4.17	812	4.02	722	3.32	373	4.65	1100	5.33	1570	3.46	346	5.36	1500	3.65	422	3.32	297
12.	3.85	628	*	400	3.27	353	4.38	968	5.00	1340	3.38	318	4.81	1110	6.01	2060	3.52	368
13.	*	550	.....	400	3.22	333	4.15	800	5.36	1590	3.38	318	4.11	956	5.25	1420	3.09	229
14.	.....	550	.....	400	3.30	365	3.92	666	4.80	1200	3.36	311	4.61	967	4.23	723	3.02	201
15.	.....	550	.....	400	3.72	556	3.98	699	4.50	1010	3.41	328	4.28	753	3.95	568	3.21	253
16.	.....	450	.....	400	4.87	1250	5.35	1580	4.23	848	3.26	276	4.34	791	3.75	468	3.25	272
17.	.....	450	.....	400	6.10	2170	4.95	1300	4.16	806	3.31	294	4.58	947	3.61	404	3.08	219
18.	.....	450	.....	400	7.20	3270	4.55	1040	4.03	728	3.28	283	4.38	817	3.55	380	3.02	201
19.	.....	450	.....	400	6.17	2230	4.28	878	3.90	655	3.28	283	4.08	689	3.45	342	3.10	225
20.	.....	450	.....	400	5.22	1490	4.42	968	3.88	644	3.26	276	3.54	376	3.55	380	2.98	190
21.	3.75	572	.....	400	4.72	1140	5.08	1400	3.76	578	3.34	304	3.58	392	4.75	1060	3.12	231
22.	3.97	694	.....	400	4.60	1070	4.58	1060	3.63	510	3.61	404	3.54	376	4.13	694	2.95	182
23.	3.63	510	.....	400	4.37	962	4.40	950	3.56	477	3.48	353	3.44	339	3.83	505	2.98	190
24.	3.57	482	.....	400	4.34	914	4.13	818	3.56	477	3.58	392	3.44	339	3.63	414	3.20	255
25.	4.80	1200	.....	400	4.27	872	4.13	818	3.60	496	3.74	463	3.44	339	3.63	414	3.10	225
26.	4.47	992	.....	400	4.34	914	6.30	2350	3.46	432	3.51	364	3.38	318	3.55	380	3.02	201
27.	4.03	728	.....	400	4.50	1010	6.00	2090	3.48	441	3.44	339	3.41	328	3.53	372	2.98	190
28.	3.95	682	.....	400	4.54	1080	5.22	1490	3.48	441	3.94	562	3.44	339	3.51	364	2.92	173
29.	3.97	694	.....	.....	4.84	1230	4.84	1230	3.46	432	4.08	639	3.44	339	3.65	422	2.88	163
30.	4.35	920	.....	.....	4.54	1080	4.60	1070	3.48	441	3.66	427	3.48	353	3.71	450	2.98	190
31.	5.57	1750	.....	.....	4.64	1090	.....	.....	3.46	432	.....	.....	3.45	342	3.63	414	.....	.....

Creek frozen Jan. 13-20 inclusive; Feb. 12-March 8 inclusive, and discharge estimated from Frankstown Branch Juniata River at Huntingdon.

ESTIMATED MONTHLY DISCHARGE OF CONODOGUINET CREEK AT BRYSON'S BRIDGE, CUMBERLAND COUNTY, PA.

(Drainage area 460 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	2920	.....	891	1.937	2.233
February,	4150	.....	812	1.765	1.838
March,	3270	.....	874	1.900	2.190
April,	2350	628	1100	2.391	2.668
May,	3010	432	930	2.022	2.331
June,	639	276	356	0.774	0.863
July,	1500	318	516	1.122	1.293
August,	2060	283	517	1.124	1.296
September,	876	163	253	0.550	0.614

*Creek frozen Jan. 12-20 inclusive; Feb. 12-March 8 inclusive, and discharge estimated from Frankstown Branch Juniata River at Huntingdon.

SUSQUEHANNA BASIN—STATION NO. 37.

SUSQUEHANNA RIVER AT HARRISBURG, PA.

DESCRIPTION OF STATION.

LOCATION—On steel, through-truss, highway bridge at Walnut Street, Harrisburg.

RECORDS AVAILABLE—Discharge complete from January 1, 1891, to September 30, 1914.

DRAINAGE AREA—24,100 square miles.

GAGE—A standard chain gage is attached to the upstream handrail in the first span from the east side. The length of chain from the bottom of the weight to the marker is 39.39 feet. The elevation of zero is 289.4 feet above sea level. Bench Mark No. 1 is top upstream corner of bridge seat on left abutment, elevation 32.99 feet above gage datum. The gage is read by E. R. Demain, Local Forecaster for the U. S. Weather Bureau, and employees of the Water Supply Commission of Pennsylvania.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is top face of left abutment in both channels, downstream side.

CHANNEL—The channel is straight above and below the station for some distance. It is divided into two parts by Hargest's Island. Both banks are high and not subject to overflow. The bed is composed of gravel and boulders.

REMARKS—During 1913 and 1914, the erection of a 4½ foot dam was under construction 4,200 feet below the bridge, and this will put backwater on the present gage.

DISCHARGE MEASUREMENTS OF SUSQUEHANNA RIVER AT HARRISBURG, DAUPHIN COUNTY, PA.

(Drainage area 24,100 square miles).

No.	Date.	Hydrographer.	Width.	Area of Section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
57	Sept. 14,	Wilson & Gough, ...	2339	6897	0.91	1.17	6250	0.6 msmt.
58	Sept. 18,	Wilson, Taylor, Brady and Gough.	2312	6169	0.64	0.87	4715	Vertical vel. msmt.

DISCHARGE TABLE FOR SUSQUEHANNA RIVER AT HARRISBURG, DAUPHIN COUNTY, FROM JAN. 1, 1914, TO SEPT. 30, 1914.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
0.00	.....	.10	23960	.20	72110	.30	121630	.40	201200
.10	.....	.20	25220	.30	73370	.40	123690	.50	203700
.20	.....	.30	26570	.40	75630	.50	125700	.60	206200
.30	.....	.40	27970	.50	77400	.60	127720	.70	208700
.40	2720	.50	29400	.60	79200	.70	129760	.80	211200
.50	3100	.60	30850	.70	81020	.80	141820	.90	213800
.60	3490	.70	32300	.80	82860	.90	143900	13.00	216400
.70	3910	.80	33750	.90	84720	10.00	146000	.10	219000
.80	4280	.90	35200	7.00	86600	.10	148120	.20	221600
.90	4680	4.00	36600	.10	88500	.20	150260	.30	224200
1.00	5400	.10	38050	.20	90400	.30	152410	.40	226800
.10	5970	.20	39500	.30	92300	.40	154570	.50	229400
.20	6580	.30	41000	.40	94200	.50	156740	.60	232000
.30	7240	.40	42550	.50	96100	.60	158920	.70	234600
.40	7940	.50	44100	.60	98040	.70	161110	.80	237200
.50	8680	.60	45650	.70	99980	.80	163320	.90	239800
.60	9460	.70	47200	.80	101920	.90	165550	14.00	242400
.70	10270	.80	48750	.90	103860	11.00	167800	.10	245100
.80	11110	.90	50250	8.00	105800	.10	170100	.20	247800
.90	12000	5.00	51800	.10	107770	.20	172400	.30	250500
2.00	12910	.10	53400	.20	109740	.30	174700	.40	253200
.10	13840	.20	55020	.30	111710	.40	177000	.50	255900
.20	14790	.30	56660	.40	113680	.50	179400	.60	258600
.30	15740	.40	58320	.50	115650	.60	181800	.70	261300
.40	16700	.50	60000	.60	117660	.70	184200	.80	264000
.50	17670	.60	61700	.70	119650	.80	186600	.90	266700
.60	18650	.70	63410	.80	121650	.90	189000	15.00	269400
.70	19650	.80	65130	.90	123650	12.00	191400	.10	272200
.80	20630	.90	66860	9.00	125650	.10	193800	.20	275000
.90	21730	6.00	68600	.10	127660	.20	196200	.30	277800
3.00	22800	.10	70350	.20	129670	.30	198700	.40	280600

DISCHARGE TABLE FOR SUSQUEHANNA RIVER AT HARRISBURG, DAUPHIN COUNTY, FROM JAN. 1, 1914, TO SEPT. 30, 1914.—Continued.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
.50	283400	.70	347700	.90	418700	.10	498100	.30	589100
.60	286200	.80	350800	20.00	422000	.20	502000	.40	593400
.70	289000	.90	353900	.10	425400	.30	505900	.50	597700
.80	291800	18.00	357000	.20	428800	.40	509900	.60	602000
.90	294800	.10	360200	.30	432200	.50	513900	.70	606400
19.00	297400	.20	363400	.40	435600	.60	518000	.80	610900
.10	300300	.30	366600	.50	439000	.70	522100	.90	615400
.20	303200	.40	369800	.60	442500	.80	526200	25.00	620000
.30	306100	.50	373000	.70	446000	.90	530300	.10	624700
.40	309000	.60	376200	.80	449500	23.00	534400	.20	629400
.50	311900	.70	379400	.90	453000	.10	538500	.30	634100
.60	314800	.80	382600	21.00	456500	.20	542600	.40	638900
.70	317700	.90	385800	.10	460100	.30	546700	.50	643500
.80	320600	19.00	389000	.20	463800	.40	550900	.60	648300
.90	323500	.10	392300	.30	467600	.50	555100	.70	653100
17.00	326400	.20	395600	.40	471400	.60	559300	.80	658000
.10	329400	.30	398900	.50	475200	.70	563500	.90	662900
.20	332400	.40	402200	.60	479000	.80	567700	26.00	667800
.30	335400	.50	405500	.70	482900	.90	571900		
.40	338400	.60	408800	.80	486600	24.00	576200		
.50	341500	.70	412100	.90	490400	.10	580500		
.60	344600	.80	415400	22.00	494200	.20	584800		

Note.—This table is only applicable from Jan. 1, 1914, to Sept. 30, 1914, and is based on two discharge measurements made in 1914, together with former curve.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF SUSQUEHANNA RIVER AT HARRISBURG, DAUPHIN COUNTY, PA.

1914	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.
1, ...	2.55	18300	11.83	187000	.....	9680	13.74	236000	6.36	74900	2.72	19900	1.62	9620	1.59	9380	1.74	10600
2, ...	2.54	18100	12.26	197000	.....	9680	12.81	199000	6.02	69000	2.48	17500	1.60	9460	1.39	7870	1.59	9380
3, ...	2.66	29200	10.35	153000	.....	9680	11.05	169000	5.56	61000	2.32	16000	1.54	8990	1.32	7380	1.72	10400
4, ...	3.34	37100	8.40	114000	.....	9680	10.98	167000	5.16	54400	2.18	14600	1.76	10600	1.26	6980	1.88	11300
5, ...	4.03	37000	7.39	94000	.....	9680	10.08	147000	4.88	50000	2.13	14100	1.64	9780	1.20	6680	1.89	11900
6, ...	4.00	36600	7.08	88100	.....	9680	8.61	118000	5.21	55200	2.14	14200	1.54	8990	1.14	6210	1.84	11500
7, ...	3.54	30000	6.66	80300	.....	9680	7.16	89600	5.61	61900	2.19	14700	1.47	8460	1.07	5800	2.00	12900
8, ...	3.26	26000	6.13	70900	.....	9680	6.78	82500	8.13	108000	2.23	15100	1.43	8160	1.01	5460	2.05	13400
9, ...	3.14	24100	5.34	57300	.....	9680	7.70	100000	7.98	105000	2.21	14900	1.42	8090	0.99	5350	1.82	11300
10, ...	2.95	22300	4.75	48000	.....	9680	11.28	174000	7.66	99200	2.28	15600	1.41	8010	1.02	5510	1.57	9230
11, ...	2.95	22300	4.54	44700	.....	9690	10.78	163000	7.64	96800	2.20	14800	1.43	8160	1.17	6400	1.44	8240
12, ...	2.98	22600	3.70	32300	.....	9690	9.44	134000	7.48	95700	2.13	14100	1.95	12500	1.22	6710	1.35	7590
13, ...	*3.01	22900	3.06	23700	.....	9680	7.86	105000	8.06	107000	2.06	13700	2.49	17600	1.54	8990	1.22	6710
14, ...	3.06	23500	2.40	16700	.....	9680	6.86	84000	11.57	181000	2.08	13700	2.38	16500	1.44	8240	1.12	6090
15, ...	3.02	23000	*2.46	17200	.....	9680	6.40	75600	12.50	204000	1.92	12200	2.32	15900	1.24	6840	1.06	5570
16, ...	2.05	13400	2.41	16800	.....	9680	7.05	87600	9.49	135000	1.65	9860	2.30	15700	1.18	6460	1.02	5510
17, ...	2.23	15100	2.30	15700	.....	9680	7.89	104000	7.90	104000	1.52	8340	2.62	18300	1.09	5910	0.96	5180
18, ...	2.90	21700	2.52	17900	8.65	119000	8.56	117000	6.46	76700	1.48	8530	2.60	18600	1.02	5510	0.84	4560
19, ...	3.10	24000	2.98	22600	8.36	123000	8.18	109000	5.65	62600	1.37	7730	2.26	15400	1.15	6280	0.78	4270
20, ...	2.99	22700	3.28	26300	8.88	123000	7.66	99200	5.12	53700	1.28	6110	1.99	12800	1.18	6460	0.81	4410
21, ...	2.95	22300	3.02	23000	6.84	83600	8.94	124000	4.70	47200	1.36	7660	1.95	12500	1.55	9070	0.79	4320
22, ...	3.18	24200	3.18	25000	5.62	62000	10.43	155000	4.28	40700	1.54	8990	1.81	11200	1.66	9960	0.76	4130
23, ...	3.08	23700	3.51	29500	5.34	57300	9.43	135000	3.96	36000	1.59	9380	1.80	11100	1.68	10100	0.73	4040
24, ...	3.21	25400	3.23	26300	5.00	51800	8.49	116000	3.66	31700	1.42	8090	1.75	10700	3.11	24000	0.77	4220
25, ...	3.42	28300	*	10600	4.76	48100	7.86	98400	3.34	27100	1.56	9150	1.56	9150	3.45	28700	0.78	4270
26, ...	3.92	35500	.....	10600	4.82	49000	7.86	98400	3.16	24100	1.51	8760	1.46	8380	2.74	20100	0.74	4090
27, ...	3.84	34300	.....	10600	6.06	69600	7.88	102000	3.00	22300	1.42	8090	1.34	7520	2.25	15300	0.72	4000
28, ...	3.95	35900	.....	10600	13.13	220000	8.32	112000	2.88	21500	1.46	8380	1.64	9780	2.02	12100	0.67	3780
29, ...	*4.02	36900	.....	.....	17.26	334000	7.92	104000	2.82	20900	1.62	9620	1.78	10900	2.08	13200	0.69	3870
30, ...	4.38	42200	.....	.....	‡17.82	351000	7.16	89600	2.97	22500	1.75	10700	1.59	9380	1.96	12500	0.63	3520
31, ...	†5.51	116000	.....	.....	15.84	293000	.....	.....	3.08	23100	.....	.....	1.78	10900	1.78	10900	.....	.....

*Frozen under gage Jan. 13 to 24 inclusive, 29 and 30, Feb. 15 to 24 inclusive. River frozen Feb. 25 to Mar. 17 inclusive, and discharge estimated from North Branch Susquehanna River at Danville. †Max. 10.10 at 5:30 p. m.=148000 sec. ft. ‡Max. 18.08 at 7 a. m.=358000 sec. ft.

ESTIMATED MONTHLY DISCHARGE OF SUSQUEHANNA RIVER AT HARRISBURG, DAUPHIN COUNTY, PA.

(Drainage area 24,100 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	14800	12400	23900	1.198	1.382
February,	197000	.....	52500	2.178	2.268
March,	358000	.....	69300	2.876	3.316
April,	238000	75600	123000	5.104	5.694
May,	204000	20900	70200	2.913	3.358
June,	19900	6110	11800	0.490	0.547
July,	18800	7520	11400	0.473	0.545
August,	28700	5350	9720	0.403	0.465
September,	13400	3620	7030	0.292	0.326

River frozen under gage Jan. 13-24 inclusive, 29 and 30, Feb. 15 to 24 inclusive. River frozen Feb. 25 to Mar. 17 inclusive, and discharge estimated from North Branch Susquehanna River at Danville.

YELLOW BREECHES CREEK.

DESCRIPTION OF BASIN.

Yellow Breeches Creek, a tributary of the lower Susquehanna River, drains an area of approximately 225 square miles. Rising in the southwestern corner of Cumberland County, it follows a northeasterly direction through the rich, agricultural region of the Cumberland Valley to its mouth in the Susquehanna River at New Cumberland, the total length being approximately 50 miles. Its course is winding, particularly near its mouth, and its slope flattens as the river is approached. There are numerous small tributaries rising in the well timbered, sandstone hills, which parallel the entire watershed on the south. The creek follows closely throughout its long and narrow watershed the foot of these hills, while on the north the valley is wide and rolling, being underlain with limestone and producing numerous copious springs, notably Boiling Springs, which are by far the largest in the State, maintaining a continuous flow of over 20,000,000 gallons per 24 hours. In the entire valley there are, owing to the presence of this limestone area, only a few small tributaries entering from the north. In the drainage basin lie many small villages, several of which obtain water supplies from the creek and its tributaries. Yellow Breeches Creek is

used quite extensively by grist mills for power purposes and its dry weather flow, maintained by the limestone springs, is remarkably large.

The mean annual precipitation over the greater portion of this watershed is from 35 to 40 inches, the balance receiving from 40 to 45 inches.

The discharge has been measured since March 22, 1909, at Olmsted's Mill, three miles above the mouth.

SUSQUEHANNA BASIN—STATION NO. 38.

YELLOW BREECHES CREEK AT OLMSTED'S MILL, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, steel, through-truss, highway bridge, just below mill dam, about one mile south of White Hill Station, Cumberland County.

RECORDS AVAILABLE—Discharge complete from March 23, 1909, to October 31, 1909, and January 22, 1910, to September 30, 1914.

DRAINAGE AREA—223 square miles.

GAGE—A standard chain gage is attached to the downstream handrail. The length of chain from the bottom of the weight to the marker is 18.35 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is top of bridge seat, right abutment, outer downstream corner, elevation 13.62 feet above gage datum. The gage is read twice daily by J. P. Wrightstone.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is top edge of bridge seat, left abutment.

CHANNEL—The channel is straight above the station for 200 feet to a 4 foot mill dam. Below the station it is straight for 75 feet and then bends to the right. Both banks are high and not subject to overflow. The bed is fairly hard and there is one channel at all stages.

REMARKS—Tailrace of mill on left bank 300 feet above the bridge comes in a little above the left abutment and, when mill is running all its wheels, water may be raised a little higher at left side of span. Water runs over the dam at all stages. This stream keeps up a remarkably high dry weather flow on account of the limestone springs on its watershed.

DISCHARGE MEASUREMENTS OF YELLOW BREECHES CREEK AT OLMSTED'S MILL, CUMBERLAND COUNTY, PA.

(Drainage area 223 square miles).

No.	Date	Hydrographer.	Width.	Area of Section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
25	May 4,	Reckord & Taylor, ...	127	350	1.24	1.75	432	Surface measurement.
26	July 29,	Reckord & Brady, ...	125	245	0.64	0.94	158	0.6 measurement.
27	Sept. 15,	Taylor & Gough, ...	124	214	0.57	0.88	123	0.6 measurement.

DISCHARGE TABLE FOR YELLOW BREECHES CREEK AT OLMSTED'S MILL, CUMBERLAND COUNTY, FROM JAN. 1, 1914.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
0.50	80	.10	580	.70	1305	.30	2265	.90	3650
.60	90	.20	620	.80	1380	.40	2335	7.00	3750
.70	105	.30	660	.90	1415	.50	2405	.10	3850
.80	125	.40	705	4.00	1470	.60	2480	.20	3950
.90	145	.50	750	.10	1525	.70	2560	.30	4055
1.00	175	.60	795	.20	1580	.80	2640	.40	4160
.10	205	.70	840	.30	1635	.90	2725	.50	4270
.20	235	.80	885	.40	1695	6.00	2815	.60	4380
.30	270	.90	930	.50	1755	.10	2905	.70	4495
.40	305	3.00	975	.60	1815	.20	2995	.80	4610
.50	340	.10	1020	.70	1875	.30	3085	.90	4730
.60	380	.20	1065	.80	1935	.40	3175	8.00	4850
.70	420	.30	1110	.90	1995	.50	3270		
.80	460	.40	1155	5.00	2060	.60	3365		
.90	500	.50	1205	.10	2125	.70	3460		
2.00	540	.60	1255	.20	2195	.80	3555		

Note.—This table is applicable subsequent to Jan. 1, 1914, and is based on 3 discharge measurements made during 1914, together with former curve.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF YELLOW BREECHES CREEK AT OLMSTED'S MILL, CUMBERLAND COUNTY, PA.

1914	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.
1, ...	1.40	305	3.54	1220	1.30	270	1.70	420	1.92	508	1.31	274	0.97	166	0.88	141	0.87	139
2, ...	1.40	305	2.74	858	1.08	199	1.72	428	1.83	472	1.28	263	0.97	166	0.86	137	0.86	137
3, ...	1.38	298	2.44	727	1.34	284	1.72	428	1.82	465	1.21	233	0.95	160	1.06	193	0.90	145
4, ...	3.12	1060	2.32	669	1.35	288	1.58	372	1.77	443	1.27	260	0.95	160	0.94	157	0.85	135
5, ...	2 41	710	2.16	604	1.32	277	1.52	348	2.34	678	1.34	284	0.92	154	0.92	151	0.88	141
6, ...	2.12	588	2.06	564	1.30	270	1.46	326	2.24	635	1.31	274	0.94	157	0.90	145	0.84	133
7, ...	1.91	504	2.19	616	1.28	263	1.46	326	1.90	500	1.23	246	0.97	166	0.91	148	0.86	137
8, ...	1.80	460	2.15	600	1.32	277	1.62	388	1.83	472	1.23	246	0.95	160	0.88	141	0.82	129
9, ...	1.76	444	1.74	436	1.36	291	1.96	524	2.70	840	1.21	238	0.95	160	0.92	151	0.82	129
10, ...	1.72	428	1.69	416	1.32	277	1.78	452	2.50	750	1.25	252	0.93	154	1.14	217	0.80	125
11, ...	1.60	380	1.78	452	1.30	270	1.68	412	2.26	544	1.21	238	2.81	890	1.35	268	0.84	133
12, ...	1.54	356	1.48	383	1.29	266	1.67	408	2.15	500	1.17	226	1.83	472	1.60	330	0.84	133
13, ...	1.58	372	1.36	291	1.38	298	1.58	372	2.31	664	1.15	220	1.31	274	1.21	238	0.84	133
14, ...	1.56	340	1.18	229	1.46	326	1.54	356	2.06	572	1.09	202	1.39	302	1.02	181	0.86	137
15, ...	1.48	326	1.42	312	1.84	476	1.62	388	1.94	516	1.09	202	1.47	330	0.93	154	0.81	127
16, ...	1.50	340	1.65	400	2.39	700	2.76	867	1.85	480	1.08	199	1.43	316	0.86	137	0.81	127
17, ...	1.52	348	1.67	408	2.78	876	2.35	682	1.73	432	1.00	175	1.28	283	0.88	141	0.84	133
18, ...	1.42	312	1.64	396	3.22	1070	2.00	540	1.75	440	1.00	175	1.15	220	0.90	145	0.82	129
19, ...	1.35	288	1.62	388	2.77	872	1.88	492	1.69	416	1.01	178	1.06	190	0.93	154	0.85	135
20, ...	1.38	291	1.60	380	2.59	790	2.12	588	1.63	392	1.02	181	1.00	176	0.97	166	0.77	119
21, ...	1.56	364	1.51	344	3.10	980	2.18	612	1.63	392	1.00	175	0.97	166	1.38	298	0.78	121
22, ...	1.58	372	1.33	280	1.90	500	2.09	576	1.53	352	1.14	217	0.94	157	1.12	211	0.84	133
23, ...	1.43	316	1.39	302	1.90	500	2.08	572	1.51	344	1.10	205	0.92	151	0.88	141	0.88	141
24, ...	1.35	480	1.12	211	1.84	476	1.95	520	1.47	330	1.08	199	0.93	154	0.86	137	0.86	137
25, ...	2.22	628	1.29	266	1.82	468	1.96	524	1.41	308	1.06	193	1.11	208	0.86	137	0.84	133
26, ...	1.88	492	1.36	291	1.88	492	2.22	1070	1.39	302	1.00	175	0.97	166	0.84	133	0.84	133
27, ...	1.78	452	1.30	270	1.90	500	2.58	786	1.37	294	0.96	168	1.17	226	0.86	137	0.84	133
28, ...	1.83	468	1.32	277	1.98	532	2.30	660	1.33	286	1.26	256	1.19	232	0.88	141	0.84	133
29, ...	1.86	484	.....	.....	1.94	516	2.14	596	1.35	288	1.16	222	0.97	166	0.94	157	0.84	133
30, ...	1.96	524	.....	.....	1.90	500	2.06	560	1.31	274	1.09	181	0.88	141	0.94	157	0.82	129
31, ...	*3.20	1060	.....	.....	1.88	492	.....	.....	1.35	288	.....	.....	0.84	133	0.90	145	.....	.....

*Max. 3.79 at 4:30 p. m.=1350 sec. ft.

ESTIMATED MONTHLY DISCHARGE OF YELLOW BREECHES CREEK AT OLMSTED'S MILL, CUMBERLAND COUNTY, PA.

(Drainage area 223 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	1350	288	454	2.036	2.347
February,	1220	211	448	2.009	2.092
March,	1070	199	458	2.054	2.368
April,	1070	326	520	2.332	2.602
May,	840	274	464	2.081	2.399
June,	284	163	219	0.982	1.096
July,	890	133	224	1.004	1.157
August,	380	133	173	0.776	0.895
September,	145	119	133	0.596	0.665

BIG SWATARA CREEK.

DESCRIPTION OF BASIN.

Big Swatara Creek, a tributary of the Susquehanna River from Schuylkill, Berks, Lebanon and Dauphin counties, drains an approximate area of 565 square miles. Rising in the hills in the southwestern part of Schuylkill County, this stream flows in a general southwesterly direction through a broad, rolling, farming country, well inhabited and largely deforested, to its mouth at Middletown, Dauphin County, a distance of about 65 miles. On the headwaters in Schuylkill County lie numerous anthracite coal mines, the culm from which pollutes the entire stream. There are numerous tributaries, the principal being Little Swatara and Quittapahilla creeks. The sub-basins of some of the tributaries are underlain with limestone and numerous strong springs contribute to its flow. The slope is flat and the flow sluggish in the lower portion. The city of Lebanon and numerous large boroughs and villages lie on the watershed. The main stream and its branches are used to some extent for domestic and industrial supply, while numerous mill and power dams cause slack water for long stretches.

The upper part of the watershed is subject to a mean annual precipitation of from 40 to 50 inches and the lower portion from 40 to 45 inches.

The discharge has been measured at Jonestown, just above the mouth of Little Swatara Creek, since November 19, 1910.

SUSQUEHANNA BASIN—STATION NO. 39.

BIG SWATARA CREEK AT JONESTOWN, PA.

DESCRIPTION OF STATION.

LOCATION—On two span, steel, through-truss, highway bridge between R. R. Station and Jonestown proper, Lebanon County.

RECORDS AVAILABLE—Discharge complete from November 21, 1910, to September 30, 1914.

DRAINAGE AREA—190 square miles.

GAGE—A sectional chain gage is fastened to the floor of the bridge on the downstream sidewalk. The length of chain from the bottom of the weight to the marker is 22.97 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is niche cut in top of corner stone on sixteenth tier from top of left abutment, downstream face, elevation 8.49 feet above gage datum. The gage is read twice daily by employees of the Lebanon Valley Consolidated Water Supply Co.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge, and by wading at low stages. The initial point for soundings is top face of left abutment.

CHANNEL—The channel is straight for 150 feet above and 200 feet below the station. Both banks are low but water passes under the bridge at all stages. The bed consists of gravel and culm.

REMARKS—There is a mill dam about 6 miles above which stores water at night. This station is maintained in co-operation with the Lebanon Valley Consolidated Water Supply Co.

DISCHARGE MEASUREMENTS OF BIG SWATARA CREEK AT JONESTOWN, LEBANON COUNTY, PA.

(Drainage area 190 square miles).

No.	Date.	Hydrographer.	Width.	Area of Section.	Mean velocity.	Gage height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
	1914							
21	Feb. 18,	Hosmer & Reckord, ..	183	354	0.72	4.92	255	Taken under ice cover.
22	Mar. 4,	Reckord & Brown, ...	183	325	1.08	4.40	352	Taken under ice cover.
23	Sept. 17,	Taylor & Gough, ...	156	151	0.26	3.10	40	0.6 msmt.

DISCHARGE TABLE FOR BIG SWATARA CREEK AT JONESTOWN, LEBANON COUNTY, FROM JAN. 1, 1912.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
2.90	0	.20	500	.50	1560	.80	2906	.10	4552
3.00	10	.30	565	.60	1660	.90	3114	.20	4674
.10	30	.40	630	.70	1770	7.00	3230	.30	4796
.20	60	.50	695	.80	1880	.10	3350	.40	4918
.30	90	.60	765	.90	1990	.20	3470	.50	5040
.40	125	.70	840	6.00	2100	.30	3590	.60	5162
.50	160	.80	915	.10	2210	.40	3710	.70	5284
.60	200	.90	995	.20	2320	.50	3830	.80	5406
.70	245	5.00	1080	.30	2430	.60	3950	.90	5528
.80	290	.10	1170	.40	2540	.70	4070	9.00	5650
.90	335	.20	1260	.50	2650	.80	4190		
4.00	385	.30	1360	.60	2766	.90	4310		
.10	440	.40	1460	.70	2882	8.00	4430		

Note.—This rating table is only applicable subsequent to Jan. 1, 1912, and is based on 3 high water discharge measurements made during 1913, together with former curve, the change having affected former tables above 7 ft.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF BIG SWATARA CREEK AT JONESTOWN, LEBANON COUNTY, PA.

1914	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.
1,	*	‡200	6.01	2110	.....	150	4.44	656	4.30	565	3.50	160	3.23	89	3.54	176	3.37	114
2,	.....	‡200	5.04	1120	.....	150	4.58	751	4.23	520	3.48	153	3.25	75	3.48	153	3.37	114
3,	.....	‡160	4.71	848	.....	150	4.46	669	4.11	445	3.46	146	3.35	108	3.52	168	3.35	108
4,	.....	‡980	4.58	751	.....	150	4.38	617	4.07	424	3.48	153	3.28	84	3.50	160	3.31	94
5,	.....	‡980	4.48	682	.....	150	4.28	562	4.68	825	3.59	196	3.31	94	3.28	84	3.26	78
6,	.....	‡980	4.32	578	.....	150	4.14	464	5.14	1210	3.46	146	3.31	94	3.34	104	3.25	75
7,	4.34	591	4.40	630	.....	150	4.05	412	4.51	702	3.43	136	3.28	84	3.24	72	3.25	75
8,	4.24	526	4.21	506	.....	150	4.32	578	4.40	630	3.42	132	3.37	114	3.26	78	3.25	75
9,	4.15	470	3.92	345	.....	150	4.78	900	4.81	923	3.46	146	3.28	84	3.34	104	3.22	66
10,	4.05	412	4.11	446	.....	150	4.58	751	4.56	736	3.39	122	3.35	108	3.24	72	3.20	60
11,	3.92	345	4.16	476	.....	150	4.68	825	4.47	673	3.36	111	4.58	751	3.26	78	3.20	60
12,	3.76	268	3.64	218	.....	150	4.48	682	4.59	758	3.32	97	3.33	100	3.30	90	3.17	51
13,	†	225	5.01	1090	.....	150	4.36	604	5.07	1110	3.33	100	3.35	108	3.24	72	3.15	45
14,	.....	225	†	165	.....	150	4.20	500	4.71	848	3.33	100	3.63	214	3.21	63	3.10	30
15,	.....	225	.....	165	.....	150	4.26	539	4.57	744	3.32	97	4.41	636	3.18	54	3.05	20
16,	.....	185	.....	165	5.21	1270	4.92	1010	4.43	650	3.33	100	4.45	662	3.17	51	3.10	30
17,	.....	185	.....	165	5.36	1430	4.70	840	4.27	516	3.33	100	4.45	662	3.07	24	3.09	28
18,	.....	185	.....	165	5.46	1520	4.58	751	4.15	470	3.24	72	3.91	340	3.06	22	3.11	33
19,	.....	185	.....	165	5.08	1150	4.48	682	4.07	424	3.23	100	3.58	192	3.07	24	3.10	30
20,	.....	185	.....	165	4.68	825	4.70	840	3.97	370	3.30	90	3.37	114	3.44	139	3.00	10
21,	.....	240	.....	165	4.38	617	4.98	1060	3.93	350	3.70	160	3.43	136	3.74	263	3.00	10
22,	4.04	407	.....	165	4.26	539	4.66	810	3.88	326	3.38	118	3.37	114	3.74	263	3.00	10
23,	3.86	326	.....	165	4.26	539	4.54	723	3.83	301	3.46	146	3.38	118	3.70	245	.....	‡10
24,	4.48	682	.....	165	4.21	506	4.68	825	3.77	276	3.36	111	3.35	108	3.66	227	3.14	42
25,	4.61	772	.....	165	4.28	562	5.52	1580	3.71	250	3.46	140	3.29	87	3.24	72	3.18	54
26,	4.24	526	.....	165	4.51	702	5.30	1360	3.69	240	3.37	114	3.27	81	3.21	63	3.15	45
27,	4.01	390	.....	165	4.68	825	5.02	1100	3.67	232	3.30	90	3.45	142	3.20	60	3.12	36
28,	4.06	412	.....	165	5.12	1190	4.71	848	3.67	232	3.34	104	4.52	709	3.22	66	3.12	36
29,	4.11	446	.....	.....	4.88	979	4.55	730	3.65	220	3.36	111	3.87	322	3.38	118	3.10	30
30,	4.28	552	.....	.....	4.74	870	4.46	669	3.53	196	3.29	87	3.59	196	3.82	299	3.00	10
31,	**5.60	1660	.....	.....	4.62	780	.....	.....	3.57	188	.....	.....	3.57	188	3.44	139	.....	.....

*Jan. 1-6 inclusive, chain broken. †Creek frozen Jan. 13-21 inclusive and Feb. 14-Mar. 15 inclusive, and discharge estimated from Conodoguinet Creek at Bryson's Bridge. **Max. 6 60 at 5 p. m.—2770 sec. ft. ‡Estimated.

ESTIMATED MONTHLY DISCHARGE OF BIG SWATARA CREEK AT JONESTOWN, LEBANON COUNTY.

(Drainage area 190 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	2770	.....	456	2.400	2.767
February,	2110	.....	438	2.305	2.400
March,	1520	.....	533	2.805	3.234
April,	1580	412	778	4.095	4.568
May,	1210	188	529	2.784	3.210
June,	196	72	121	0.637	0.711
July,	751	69	222	1.168	1.347
August,	299	22	116	0.611	0.704
September,	114	10	49	0.258	0.288

Creek frozen Jan. 13-21 inclusive, and Feb. 14-Mar. 15 inclusive; and discharge estimated from Conodoguinet Creek at Bryson's Bridge.

POTOMAC BASIN

MONOCACY RIVER.

DESCRIPTION OF BASIN.

The Monocacy River, one of the largest tributaries of the Potomac River, rises in Adams County, Pennsylvania, in two branches; namely, Rock and Marsh creeks. Rock Creek rises in the central part of Adams County, in Strabane Township, and flows in a southerly direction into Maryland. Marsh Creek rises in the western part of Adams County, in Franklin Township, and flows southeasterly to its confluence with Rock Creek, about one-quarter mile below the state line, thus forming the Monocacy River. Several tributaries joining the Monocacy River, in Maryland, drain portions of southwestern and southeastern Adams County, Pennsylvania; namely, Alleway, Piney and Middle creeks. The total drainage area of the Monocacy River is approximately 940 square miles, of which 231 lie in Pennsylvania. Its length, below the confluence of Rock and Marsh creeks, is about 55 miles. The river throughout the greater portion of its course flows through a rolling, limestone country of highly cultivated farms and is polluted by washings from tanneries and mills along its banks and its tributaries. The largest towns in its watershed are Gettysburg, Pennsylvania, and Frederick, Md., the former of which obtains part of its domestic water supply from Marsh Creek, while the latter receives its domestic water supply from the parent stream. There are numerous small mills on its tributaries which are operated by water power.

The mean annual precipitation over this watershed, in Pennsylvania, is from 40 to 45 inches.

The discharge of this stream has been measured at Frederick, Md., since August 4, 1896.

POTOMAC BASIN—STATION NO. 1.

MONOCACY RIVER NEAR FREDERICK, MD.

DESCRIPTION OF STATION.

LOCATION—At the county iron bridge on the turnpike four miles northeast of Frederick on the road leading from Frederick to Mt. Pleasant, Md.

RECORDS AVAILABLE—Discharge complete from August 4, 1896, to September 30, 1914.

DRAINAGE AREA—660 square miles.

GAGE—A standard chain gage is fastened in the middle of the first span from the right bank. The length of chain from the bottom of the weight to the marker is 34.18 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is a hole drilled in the top of a coping stone on the lower wing of the right abutment, about 100 feet back from the initial point for soundings, elevation 29.17 feet above gage datum. The gage is read twice daily.

DISCHARGE MEASUREMENTS—Taken from the two span highway bridge. The right channel is measured from the lower side and the left channel from the upper side. The initial point for soundings is a cross cut in the face of the parapet wall on the lower wing of the right abutment.

CHANNEL—The channel is straight above and below the station for 300 feet and 100 feet respectively. Both banks are low and subject to overflow, although all water passes under the bridge. The bed is composed of gravel and cobble stones.

REMARKS—The following data have been furnished by the United States Geological Survey.

DISCHARGE MEASUREMENTS OF MONOCACY RIVER NEAR FREDERICK, MD.

(Drainage area 660 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1913		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
38	Aug. 14,	Padgett & Batchelder,	132	175	0.95	4.36	166	0.6 msmt.
39	Aug. 28,	Stevens, ...	76	63	1.20	4.04	76	Wading msmt. above bridge.
40	Aug. 28,	Stevens, ...	84	59	1.29	4.04	76	Wading msmt. above bridge.

Note.—These measurements have been published in the 1912 report of the Water Supply Commission, but have been revised by the U. S. Geological Survey.

DISCHARGE TABLE FOR MONOCACY RIVER NEAR FREDERICK, MD., FOR 1912.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
3.00	.....	.10	411	.20	1705	.30	3615	.40	5640
.10	.....	.20	453	.30	1790	.40	3710	.50	5740
.20	.....	.30	498	.40	1875	.50	3805	.60	5840
.30	.....	.40	545	.50	1960	.60	3900	.70	5940
.40	.....	.50	593	.60	2045	.70	3995	.80	6040
.50	.....	.60	643	.70	2130	.80	4090	.90	6140
.60	.....	.70	695	.80	2220	.90	4185	12.00	6240
.70	24	.80	749	.90	2310	10.00	4280	.10	6340
.80	36	.90	805	8.00	2400	.10	4375	.20	6440
.90	50	6.00	863	.10	2490	.20	4470	.30	6540
4.00	68	.10	922	.20	2580	.30	4565	.40	6640
.10	89	.20	983	.30	2670	.40	4660	.50	6740
.20	113	.30	1046	.40	2760	.50	4755	.60	6840
.30	139	.40	1111	.50	2855	.60	4850	.70	6945
.40	167	.50	1178	.60	2950	.70	4945	.80	7050
.50	197	.60	1247	.70	3045	.80	5040	.90	7155
.60	227	.70	1318	.80	3140	.90	5140	13.00	7260
.70	259	.80	1391	.90	3235	11.00	5240		
.80	294	.90	1467	9.00	3330	.10	5340		
.90	331	7.00	1545	.10	3425	.20	5440		
5.00	370	.10	1625	.20	3520	.30	5540		

This table is not applicable for ice or obstructed channel conditions. It is based on 4 discharge measurements made during low water of 1913 and 1914 and form of previous curves, and is well defined for 1913 and 1914 between gage heights 3.9 feet and 4.3 feet. Above gage height 12.6 feet the rating curve is a tangent, the difference being 105 per tenth. Fairly well defined for 1912 and 1913-14 above 4.8.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF MONOCACY RIVER NEAR FREDERICK, MD.

1912.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.		OCT.		NOV.		DEC.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1, ...	9.5	3800	5.6	643	7.[illegible]	1960	7.6	2040	6.5	1180	4.9	331	4.9	331	4.7	259	4.30	139	6.3	1050	4.4	167	4.4	167
2, ...	7.5	1960	5.6	643	6.9	1470	7.4	1880	5.7	695	4.8	294	4.7	259	4.9	331	4.30	139	5.8	749	4.4	167	4.4	167
3, ...	6.5	1180	5.6	643	6.2	983	8.5	2860	5.5	593	4.7	259	4.6	227	4.6	227	4.30	139	5.3	498	4.5	197	4.5	197
4, ...	6.3	1050	5.5	593	5.9	805	6.7	1320	5.4	545	4.7	259	4.6	227	4.5	197	4.60	227	5.2	453	4.5	197	4.7	259
5, ...	6.1	922	5.6	643	5.5	593	6.5	1180	5.3	498	4.7	259	4.7	259	4.3	139	4.50	197	5.1	411	4.5	197	4.7	259
6, ...	5.9	805	5.9	450	5.7	695	6.4	1110	5.3	498	4.7	259	4.6	227	4.4	167	4.40	167	5.0	370	4.5	197	5.3	498
7, ...	6.0	600	5.8	450	5.9	805	6.2	983	6.4	1110	4.7	259	4.6	227	4.3	139	4.40	167	4.9	331	4.5	197	6.8	1390
8, ...	6.4	600	5.8	450	6.4	1110	8.2	2580	6.2	983	4.7	259	4.5	197	4.3	139	4.50	197	4.8	294	7.5	1960	5.1	411
9, ...	7.0	800	5.8	450	6.6	1250	6.9	1470	6.7	1320	4.7	259	4.4	167	4.7	259	4.40	167	4.8	294	6.3	1050	5.0	370
10, ...	7.0	600	5.8	450	6.5	1180	6.5	1180	6.4	1110	4.6	227	4.3	139	4.7	259	4.30	139	4.7	259	5.2	453	4.9	331
11, ...	6.9	600	5.9	450	6.3	1050	6.3	1050	5.7	696	4.5	197	4.4	167	9.1	3420	4.30	139	4.7	259	5.2	453	4.7	259
12, ...	6.5	600	5.9	450	6.0	863	5.8	749	6.0	863	4.5	197	4.7	259	8.5	2860	4.20	113	4.7	259	5.0	370	4.5	197
13, ...	6.5	600	5.8	450	13.5	7780	5.8	749	6.5	1180	4.5	197	5.3	498	6.9	1470	4.00	68	4.7	259	4.8	294	4.3	139
14, ...	6.5	600	5.8	450	13.8	8100	6.9	1470	5.7	695	4.5	197	5.0	370	4.9	331	4.00	68	4.6	227	4.7	259	4.3	139
15, ...	6.5	600	5.8	450	17.4	11900	6.1	922	5.7	695	4.5	197	4.7	259	4.6	227	4.00	68	4.6	227	4.6	227	4.5	197
16, ...	6.4	600	5.7	450	19.4	14000	7.1	1620	5.7	695	5.0	370	4.6	227	4.6	227	4.00	68	4.5	197	4.6	227	4.5	197
17, ...	6.4	600	5.5	450	9.7	4000	7.0	1540	7.5	1960	4.9	331	4.6	227	4.5	197	4.00	68	4.5	197	4.6	227	4.5	197
18, ...	5.9	600	5.3	498	8.5	2860	7.4	1880	6.9	1470	4.8	294	8.6	2950	4.5	197	4.00	68	4.5	197	4.5	197	4.6	227
19, ...	6.0	600	5.2	453	8.2	2580	7.1	1620	5.7	695	4.8	294	7.6	2040	4.5	197	4.20	113	4.5	197	4.5	197	5.4	545
20, ...	6.2	600	7.1	1620	8.0	2400	6.4	1110	5.3	498	4.8	294	5.0	370	4.5	197	4.10	89	4.5	197	4.5	197	5.3	498
21, ...	6.1	600	7.5	1960	8.7	3040	6.2	983	5.4	545	4.7	259	5.0	370	4.8	294	4.10	89	4.5	197	4.5	197	5.2	453
22, ...	5.9	600	18.5	13000	8.3	2870	5.9	805	5.3	498	4.6	227	6.3	1050	4.6	227	4.10	89	4.6	227	4.5	197	5.2	453
23, ...	5.9	600	9.0	3330	7.5	1960	5.8	749	5.2	453	4.6	227	5.6	643	4.5	197	4.25	126	4.7	259	4.5	197	5.2	453
24, ...	5.9	600	7.1	1620	12.9	7160	5.6	643	5.1	411	4.6	227	5.5	593	4.5	197	7.00	1540	4.9	331	4.5	197	5.3	498
25, ...	5.7	600	6.5	1180	12.0	6240	5.5	593	5.1	411	5.2	453	6.0	863	4.5	197	22.70	17400	4.9	331	4.5	197	5.5	593
26, ...	5.7	600	14.1	8420	9.5	3800	5.5	593	5.0	370	5.2	453	5.5	593	4.4	167	18.50	13000	4.7	259	4.5	197	5.6	643
27, ...	5.6	600	15.4	9780	8.4	2760	6.0	863	4.8	294	7.7	2130	5.1	411	4.3	139	7.90	2310	4.6	227	4.5	197	6.3	1050
28, ...	5.5	593	9.5	3800	7.4	1880	5.9	805	4.8	294	5.7	695	4.9	331	4.3	139	7.50	1960	4.6	227	4.5	197	6.7	1320
29, ...	5.5	593	8.9	3240	18.0	12500	5.8	749	4.8	294	5.2	453	4.7	259	4.3	139	6.90	1470	4.6	227	4.4	167	6.0	863
30, ...	5.5	593	....	.....	10.9	5140	6.9	1470	5.0	370	5.0	370	4.9	331	4.3	139	6.50	1180	4.5	197	4.4	167	10.6	4850
31, ...	5.5	593	....	.....	8.5	2860	....	.....	5.0	370	....	.....	4.8	294	4.3	139	.....	.....	4.4	167	.....	.....	15.0	9360

Affected by ice Jan. 7-27 and Feb. 6-17. This table supersedes that published in the 1912 report, the gage heights having been revised.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF MONOCACY RIVER NEAR FREDERICK, MD.

1913.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.		OCT.		NOV.		DEC.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1, ...	8.9	3240	6.5	1180	5.9	805	7.2	1700	....	887	5.6	643	4.4	167	5.40	545	4.05	78	7.80	2220	5.15	432	5.15	432
2, ...	8.5	2860	6.1	922	5.5	593	6.5	1180	....	752	5.4	545	4.4	167	7.80	2220	4.05	78	8.70	3040	4.95	350	5.05	390
3, ...	10.5	4760	5.8	749	5.4	545	6.9	1470	....	667	5.2	453	4.3	139	5.10	411	3.95	59	5.85	777	4.85	312	4.95	350
4, ...	8.9	3240	6.7	1320	5.1	411	6.7	1320	...	582	5.1	411	4.3	139	4.80	294	3.85	43	5.35	522	4.85	312	4.95	350
5, ...	8.1	2490	6.6	1250	5.1	411	6.5	1180	5.3	498	5.0	370	4.3	139	4.40	167	3.85	43	4.85	312	4.75	276	4.85	312
6, ...	7.9	2310	5.7	695	5.0	370	6.4	1110	5.1	411	4.9	331	4.6	227	4.20	113	3.85	43	4.55	212	4.75	276	4.85	312
7, ...	7.3	1790	5.6	643	4.9	331	6.2	983	5.1	411	4.9	331	4.5	197	4.00	68	3.85	43	4.35	153	4.65	243	8.00	2400
8, ...	8.7	3040	5.6	643	4.7	259	5.9	805	5.1	411	4.8	294	4.4	167	4.00	68	3.85	43	4.35	153	4.65	243	7.80	2220
9, ...	7.5	1960	5.5	593	4.7	259	5.7	696	5.0	370	4.8	294	4.3	139	4.00	68	3.75	30	4.25	126	5.15	432	6.20	983
10, ...	6.5	1180	5.4	545	4.7	259	5.6	643	4.9	331	4.7	259	4.3	139	4.00	68	3.75	30	4.25	126	5.75	722	5.95	834
11, ...	6.4	1110	5.4	545	6.7	1320	5.6	643	4.9	331	4.7	259	4.3	139	5.00	370	3.75	30	4.55	212	5.25	476	5.75	722
12, ...	8.1	2490	5.3	498	5.9	805	10.0	4280	4.9	331	4.7	259	4.3	139	4.90	331	3.75	30	4.95	350	5.15	432	5.55	618
13, ...	7.2	1700	4.6	227	5.6	643	9.9	4180	4.9	331	4.6	227	4.3	139	4.80	294	3.75	30	4.75	276	5.05	390	5.35	522
14, ...	6.1	922	4.5	197	16.0	10400	9.7	4000	4.9	331	4.5	197	4.3	139	4.20	113	3.75	30	4.35	153	4.95	350	5.25	476
15, ...	5.9	805	5.3	498	11.2	5440	10.5	4760	4.9	331	4.5	197	4.3	139	4.15	101	3.75	30	4.25	126	4.95	350	5.15	432
16, ...	6.4	1110	5.2	453	12.5	6740	9.2	3520	4.9	331	4.5	197	4.3	139	4.15	101	3.75	30	4.15	101	6.80	1390	5.05	390
17, ...	8.2	2580	5.2	453	8.6	2950	8.5	2860	5.0	370	4.5	197	4.2	113	4.05	78	3.75	30	4.15	101	8.00	2400	4.95	350
18, ...	7.1	1620	5.1	411	7.1	1620	7.1	1620	5.3	498	4.4	167	4.2	113	4.05	78	3.75	30	4.15	101	5.95	834	4.85	312
19, ...	6.9	1470	5.2	453	6.7	1320	6.9	1470	5.1	411	4.4	167	4.2	113	4.05	78	3.85	43	4.15	101	5.85	777	4.85	312
20, ...	6.4	1110	5.2	453	6.5	1180	6.4	1110	4.9	331	4.4	167	4.2	113	5.05	390	4.05	78	4.45	182	5.65	669	4.75	276
21, ...	6.2	983	5.3	498	6.4	1110	6.3	1050	4.9	331	4.4	167	4.1	89	4.35	153	5.60	643	4.85	312	5.35	522	4.75	276
22, ...	6.2	983	5.7	695	6.2	983	5.9	805	4.9	331	5.5	593	4.1	89	4.25	126	10.60	4850	4.95	350	5.25	476	4.75	276
23, ...	6.1	922	6.3	1050	5.9	805	5.8	749	5.9	805	4.6	227	4.0	68	4.25	126	5.75	722	4.85	312	5.15	432	6.40	1110
24, ...	6.1	922	5.8	749	5.8	749	5.8	749	6.9	1470	4.6	227	4.0	68	4.15	101	4.55	212	4.75	276	4.95	350	10.80	5040
25, ...	6.0	863	5.4	545	5.8	749	5.8	749	6.5	1180	4.6	227	3.9	50	4.15	101	5.35	522	13.60	7890	4.85	312	10.20	4470
26, ...	6.0	863	5.2	453	6.9	1470	5.8	749	5.5	593	4.7	259	3.9	50	4.15	101	4.15	101	12.20	6440	4.75	276	13.60	7890
27, ...	6.0	863	5.2	453	18.5	13000	5.8	749	7.5	1960	4.6	227	3.8	36	4.05	78	4.05	78	9.20	3520	4.75	276	8.80	3140
28, ...	6.4	1110	5.7	695	18.7	13200	7.2	1700	7.4	1880	4.5	197	3.9	50	4.05	78	4.05	78	8.20	2580	4.75	276	8.00	2400
29, ...	6.3	1050	....	.....	9.1	3420	6.2	983	6.9	1470	4.4	167	3.9	50	4.05	78	3.95	59	5.85	777	5.25	476	6.80	1390
30, ...	6.3	1050	....	.....	8.5	2860	6.1	922	6.4	1110	4.4	167	3.9	50	4.15	101	3.95	59	5.55	618	5.15	432	5.95	834
31, ...	6.2	983	....	.....	7.5	1960	....	.....	6.2	983	....	.....	4.9	331	4.05	78	.....	.....	5.25	476	.....	.....	5.55	618

Gage out of repair May 1-4, discharges interpolated. Probably slight ice effect during Feb., no correction made. This table supersedes that published in the 1913 report, the gage heights having been revised.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF MONOCACY RIVER NEAR FREDERICK, MD.

1914	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.
1, ...	5.?	805	14.2	8520	5.2	450	6.2	983	5.9	805	4.65	243	4.45	182	4.15	101	4.55	212
2, ...	6.9	863	10.1	4380	5.3	450	6.1	922	5.9	805	4.85	312	4.35	153	4.15	101	4.35	153
3, ...	6.8	1390	7.0	1540	6.4	450	6.1	922	5.8	749	4.75	276	4.35	153	4.15	101	4.35	153
4, ...	12.8	7050	6.7	1320	6.4	450	6.0	863	5.8	749	4.65	243	4.35	153	4.05	78	4.25	126
5, ...	12.2	6440	6.5	1180	6.4	450	5.7	695	6.3	1050	4.65	243	4.25	126	4.05	78	4.15	101
6, ...	10.3	4760	6.5	1180	6.2	450	5.5	593	6.5	1390	4.75	276	4.25	126	4.05	78	4.15	101
7, ...	9.3	3090	6.5	1180	5.6	643	5.4	545	6.8	1390	4.75	276	4.95	350	4.05	78	4.15	101
8, ...	7.8	2220	6.8	1390	5.8	749	5.4	545	7.4	1880	4.65	243	4.55	212	4.00	68	4.05	78
9, ...	7.1	1620	6.2	983	5.7	695	5.5	593	9.0	3330	4.65	243	4.45	182	3.95	59	3.95	59
10, ...	6.7	1320	7.7	*850	5.5	593	5.5	593	7.2	1700	4.65	243	4.45	182	4.45	182	3.95	59
11, ...	6.4	1110	7.5	850	5.4	545	5.7	695	6.7	1320	4.65	243	9.60	3900	4.45	182	3.95	59
12, ...	6.2	983	7.3	850	5.3	498	5.6	643	6.7	1320	4.65	243	6.80	1390	4.45	182	3.95	59
13, ...	5.9	805	7.2	850	5.2	453	5.5	593	6.8	1390	4.55	212	4.65	243	4.25	126	3.95	59
14, ...	6.9	*760	7.1	850	5.5	593	5.5	593	6.7	1320	4.45	182	4.65	243	4.25	126	3.95	59
15, ...	6.7	720	7.1	850	7.5	1960	7.8	2220	6.5	1180	4.35	153	4.95	350	4.25	126	3.95	59
16, ...	6.0	680	7.1	850	12.5	6740	10.4	4660	6.3	1050	4.25	126	4.95	350	4.45	182	3.95	59
17, ...	5.6	643	7.1	750	12.6	6840	8.2	2580	5.5	593	4.25	126	9.40	3710	4.45	182	3.85	43
18, ...	5.5	593	7.1	750	13.5	7780	6.7	1320	5.4	545	4.25	126	5.95	834	4.25	126	3.85	43
19, ...	5.5	593	7.1	750	9.8	4090	6.3	1050	5.2	453	4.25	126	5.85	777	4.05	78	3.85	43
20, ...	5.5	593	6.3	750	7.8	2220	6.8	1390	5.1	411	4.15	101	5.35	522	3.95	59	3.85	43
21, ...	5.4	545	6.2	750	7.0	1540	7.8	2220	5.1	411	4.15	101	4.55	212	3.95	59	3.85	43
22, ...	5.4	545	5.6	550	6.9	1470	6.4	1110	5.0	370	4.15	101	4.25	126	3.95	59	3.85	43
23, ...	5.4	545	5.5	550	6.8	1390	5.9	805	4.9	331	4.55	212	4.26	126	3.95	59	3.85	43
24, ...	5.9	805	5.5	550	6.7	1320	5.8	749	4.8	294	4.55	212	4.15	101	3.95	59	3.85	43
25, ...	10.1	4380	5.5	350	6.5	1180	5.8	749	4.8	294	4.45	182	4.15	101	7.20	1700	4.35	153
26, ...	8.4	2760	5.5	350	6.5	1180	10.9	5140	4.8	294	4.75	276	4.15	101	5.95	834	4.15	101
27, ...	6.3	1050	5.5	350	6.4	1110	8.1	2490	4.8	294	4.95	350	4.05	78	4.65	243	3.95	59
28, ...	6.2	983	5.2	350	6.3	1050	7.1	1620	4.8	294	5.45	569	4.05	78	4.65	243	3.95	59
29, ...	6.2	983	.....	.....	6.3	1050	6.4	1110	4.8	294	5.35	522	4.25	126	8.00	2400	3.85	43
30, ...	6.5	1180	.....	.....	6.2	983	6.1	922	4.8	294	4.45	182	4.25	126	5.65	669	3.85	43
31, ...	10.4	4660	.....	.....	6.2	983	.....	.....	4.7	259	.....	.....	4.15	101	5.15	432	.....	.....

*Estimated January 14 to 16 and February 10 to March 6 account of ice effect.

ESTIMATED MONTHLY DISCHARGE OF MONOCACY RIVER NEAR FREDERICK, MD.

(Drainage area 660 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean	Second-feet per square mile.	Depth in inches.
a1912.					
January,	3800	.....	796	1.210	1.40
February,	13000	.....	1980	3.000	3.24
March,	14000	593	3750	5.680	6.55
April,	2980	593	1250	1.890	2.11
May,	1960	294	719	1.090	1.26
June,	2130	197	358	0.542	0.60
July,	2960	139	496	0.750	0.86
August,	3420	139	433	0.656	0.76
September,	17400	68	1390	2.110	2.35
October,	1050	167	309	0.468	0.54
November,	1960	167	311	0.471	0.52
December,	9360	139	877	1.330	1.53
The year,	17400	68	1050	1.600	21.72
b1913.					
January,	4760	805	1690	2.560	2.950
February,	1220	197	638	0.967	1.010
March,	13200	259	2480	3.760	4.340
April,	4760	643	1620	2.450	2.730
May,	1960	331	677	1.030	1.190
June,	643	167	281	0.426	0.480
July,	331	36	124	0.188	0.220
August,	2220	68	228	0.345	0.400
September,	4850	30	272	0.412	0.460
October,	7890	101	1060	1.610	1.860
November,	2400	243	516	0.782	0.780
December,	7890	276	1300	1.970	2.270
The year,	13200	30	913	1.380	18.690
c1914.					
January,	7050	545	1820	2.76	3.18
February,	3520	.....	1230	1.86	1.94
March,	7780	.....	1620	2.45	2.82
April,	5140	545	1330	2.02	2.25
May,	3330	259	866	1.31	1.51
June,	569	101	231	0.350	0.39
July,	3900	78	497	0.753	0.87
August,	2400	59	292	0.442	0.51
September,	212	43	77	0.116	0.13

a Affected by ice Jan. 7-27 and Feb. 6-17.
b Estimated January 14 to 16 and Feb. 10 to Mar. 6 account ice effect.
c Gage out of repair May 1-4, discharges interpolated. Probably slight ice effect during Feb., no correction made.
Note.—1912 and 1913 monthly revised from former reports on account of gage height corrections.

OHIO BASIN

ALLEGHENY RIVER.

DESCRIPTION OF BASIN.

The Allegheny River, the largest tributary of the Ohio River in Pennsylvania draining 11,775 square miles in Pennsylvania and New York, rises in the hilly plateau on the west slope of the Allegheny Mountains in northwestern Pennsylvania, at an elevation of about 2250 feet above sea level. Its tributaries drain the west slope of these mountains from Somerset County, near the southern boundary, through the Conemaugh River, to the extreme northern boundary, and westward nearly to the Ohio line through Oil and French creeks.

Its actual source is in Potter County, in about the center of the northern border of the State, whence it flows northwesterly for about 50 miles into New York, thence southwesterly into Pennsylvania again, 47 miles being in New York. From this point it is 213 miles to the mouth, its junction with the Monongahela River at Pittsburgh, where the Ohio River is formed, the total length of the river being 310 miles.

In Potter and McKean counties the river and its tributaries are small mountain streams, in well wooded, steep valleys, and a sparsely inhabited region. In New York the main valley is wide and flat, the slope slight and the land under a high state of cultivation, and thickly populated. Coming back into Pennsylvania the hills converge, the valley narrowing and the slope is steeper. The population again becomes scattered, the tributary valleys well wooded, and the bordering hills are high and timbered. The larger tributaries, however, contain large areas of cleared, cultivated land, notably those from the west.

The lower 150 miles is more densely populated, many railroads and large towns and thriving industries bordering its banks, and using its waters. For 25 miles above Pittsburgh the river has been slackwatered by three dams and the banks are almost continuously populated.

For the upper 30 miles, the slope is 27 feet per mile, the next 65 miles, 2.4 feet per mile, the next 87 miles, 3.7 feet per mile, and the lower 126 miles, 2.1 feet per mile.

In the first 115 miles of its length the river bed consists mostly of fine sand and gravel, much of it lying above the terminal morain; from this point, however, the bottom changes to loose stones and boulders, riffles occur frequently, but seldom is solid rock in evidence.

The largest tributary, the Kiskiminitas River, draining 1,892 square miles, comes in 25 miles above the junction of the Monongahela and Allegheny rivers, no streams of importance joining it between. From that point up many large tributaries come in, mostly from the east, as follows: Crooked, Mahoning and Red Bank creeks, Clarion River French, Oil, Tionesta, Brokenstraw, Conewango and Kinzua creeks, several of which drain over 1,000 square miles. Those from the west, French, Oil, Brokenstraw and Conewango drain the glaciated area, containing numerous lakes and swamps, and rounded gravel hills with little timber while their watersheds are quite generally cultivated. Those from the east drain a mountainous, timbered and less inhabited and cultivated country.

The drainage basin is about 124 miles in extreme width and 175 miles in length, much narrower at its southern point, and its greatest width is at the Pennsylvania-New York State line.

The basin embraces widely varying topographic conditions, ranging from high, rough mountainous country along the east boundary, to broad, terraced valleys with wide bottom lands in New York State. In it are included the oil and gas producing regions, vast bituminous coal fields, much of the remaining merchantable timber and many other valuable natural resources.

Most of this basin lies in the zone of 40 to 45 inch rainfall, while a small portion along the southwestern part is subject to 45 to 50 inch rainfall, and another small section near the mouth from 35 to 40 inches.

The flow is measured at Kittanning, 48 miles above Pittsburgh, and at Red House, New York, since August 18, 1904, and September 4, 1903, respectively.

OHIO BASIN—STATION NO. 1.

ALLEGHENY RIVER AT RED HOUSE, N. Y.

DESCRIPTION OF STATION.

LOCATION—On Red House bridge near the station of the Erie and Pennsylvania railroads about 5 miles below Salamanca, N. Y.

RECORDS AVAILABLE—Discharge complete from September 4, 1903, to September 30, 1914.

DRAINAGE AREA—1,640 square miles.

GAGE—A standard chain gage is fastened to the upstream side of the bridge near middle of left span. The length of chain from the bottom of the weight to the marker is 24.16 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is a circle cut on the downstream side of the left abutment, elevation 21.09 feet above gage datum. The gage is read by O. A. Gates.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is left end of downstream side of bridge.

CHANNEL—The channel is straight above and below the station for 800 feet. The right bank is high and does not overflow. The left bank overflows only at flood stages. The bed is composed of gravel.

REMARKS—The following data have been furnished by the U. S. Geological Survey.

DISCHARGE MEASUREMENTS OF ALLEGHENY RIVER AT RED HOUSE, N. Y.

(Drainage area 1,640 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
	1914							
38	Aug. 24,	DeGolyer, ...	336	1140	0.62	3.62	704	0.2 and 0.8 method.
39	Aug. 24,	DeGolyer, ...	336	1140	0.64	3.65	734	0.2 and 0.8 method.

DISCHARGE TABLE FOR ALLEGHENY RIVER AT RED HOUSE, N. Y., FROM APRIL 1 ,1913.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
2.80	100	.80	1580	.80	4570	.30	9100	.80	15000
.90	150	.40	1740	.90	4830	.40	9450	.90	15450
3.00	200	.50	1900	6.00	5090	.50	9800	9.00	15900
.10	250	.60	2070	.10	5360	.60	10150	.10	16350
.20	330	.70	2240	.20	5630	.70	10500	.20	16800
.30	410	.80	2420	.30	5910	.80	10850	.30	17300
.40	500	.90	2610	.40	6190	.90	11250	.40	17800
.50	600	5.00	2800	.50	6480	8.00	11650	.50	18300
.60	700	.10	3000	.60	6780	.10	12050	.60	18800
.70	810	.20	3200	.70	7080	.20	12450	.70	19300
.80	920	.30	3410	.80	7390	.30	12850	.80	19800
.90	1040	.40	3630	.90	7720	.40	13250	.90	20300
4.00	1170	.50	3850	7.00	8050	.50	13650	10.00	20800
.10	1300	.60	4080	.10	8400	.60	14100		
.20	1440	.70	4320	.20	8760	.70	14550		

Note.—This table is only applicable subsequent to April 1, 1913 and is based on 8 discharge measurements made during 1912 and 1913 and coincides with former curve above gage height 6.1 ft.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF ALLEGHENY RIVER AT RED HOUSE, N. Y.

1914	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G. H	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.
1,	3.85	960	.....	.....	.....	.....	9.8	19800	4.6	2070	3.8	920	3.25	370	3.1	260	3.75	865
2,	3.85	960	.....	.....	.....	.....	8.4	13200	4.45	1820	3.85	980	3.3	410	3.1	260	3.7	810
3,	3.8	920	.....	.....	.....	.....	7.6	10200	4.0	1170	3.9	1040	3.35	455	3.0	200	3.5	600
4,	3.95	1100	.....	.....	.....	.....	7.2	8750	4.1	1300	3.8	920	3.3	410	3.0	200	3.55	650
5,	3.8	920	.....	.....	.....	.....	7.7	10500	4.6	2070	4.2	1440	3.3	410	3.0	200	3.7	810
6,	3.8	920	.....	.....	.....	.....	7.5	9800	7.2	8750	3.9	1040	3.2	330	3.0	200	3.4	500
7,	3.85	.....	.....	.....	.....	.....	8.2	12400	6.8	7390	3.55	650	3.25	370	3.0	200	3.45	550
8,	3.9	.....	5.2	3200	.....	.....	8.4	13200	6.6	6780	3.7	810	3.3	410	3.0	200	3.4	500
9,	3.95	.....	4.95	2700	.....	.....	8.2	12400	6.5	6480	3.75	865	3.3	410	3.05	230	3.3	410
10,	4.2	.....	4.25	1520	.....	.....	7.8	10800	6.6	6780	3.55	650	3.3	410	3.05	230	3.3	410
11,	4.6	.....	4.8	2420	.....	.....	7.7	10500	8.5	13600	3.3	410	3.2	330	3.0	200	3.35	455
12,	4.75	.....	4.45	1820	.....	.....	7.1	8400	8.8	15000	3.4	500	3.25	370	3.0	200	3.25	370
13,	.....	.....	4.55	1980	.....	.....	7.0	8050	10.4	22900	3.5	600	3.3	410	3.0	200	3.1	260
14,	.....	.....	4.5	1900	3.6	700	7.3	9100	10.4	22900	3.5	600	3.3	410	3.1	260	3.15	295
15,	.....	.....	4.35	1680	3.8	920	7.4	9450	8.4	13200	3.55	650	3.3	410	3.0	200	3.15	295
16,	.....	.....	4.4	1740	4.45	1820	7.2	8750	6.8	7390	3.5	600	3.25	370	3.1	260	3.15	295
17,	.....	.....	4.05	1240	5.0	2800	7.2	8750	5.6	4080	3.4	500	3.3	410	3.2	330	3.1	260
18,	.....	.....	4.0	1170	7.6	10200	7.0	8050	5.6	4080	3.65	755	3.3	410	3.1	260	3.15	295
19,	.....	.....	3.8	920	6.2	5630	7.0	8050	4.85	2520	3.55	650	3.25	370	3.2	330	3.15	295
20,	.....	.....	3.8	.....	5.3	3410	7.0	8050	4.45	1820	3.6	700	3.25	370	3.25	370	3.1	260
21,	.....	.....	3.95	.....	5.8	4570	7.2	8750	4.55	1980	3.4	500	3.2	330	3.1	260	3.1	260
22,	.....	.....	3.8	.....	5.2	3200	7.2	8750	4.8	2420	3.5	600	3.25	370	3.2	330	3.15	295
23,	.....	.....	.....	.....	4.9	2610	6.8	7390	4.9	2610	3.6	700	3.0	200	3.25	370	3.15	295
24,	.....	.....	.....	.....	4.75	2330	6.4	6190	4.5	1900	3.5	600	3.0	200	3.55	650	3.15	295
25,	.....	.....	.....	.....	4.9	2610	5.0	2800	4.55	1980	3.4	500	3.15	295	3.6	700	3.1	260
26,	.....	.....	.....	.....	7.6	10200	5.2	3200	4.4	1740	3.4	500	3.1	260	3.65	755	3.05	230
27,	5.5	3850	.....	.....	9.2	16800	4.95	2700	4.55	1980	3.45	550	3.1	260	3.65	755	3.0	200
28,	5.6	4080	.....	.....	11.7	30000	4.7	2340	4.4	1740	3.3	410	3.1	260	3.6	700	3.05	230
29,	7.0	8050	.....	.....	11.4	28400	4.75	2330	4.65	2160	3.3	410	3.0	200	3.55	650	3.0	200
30,	9.0	15900	.....	.....	10.6	24000	4.8	2420	4.45	1820	3.3	410	3.0	200	3.7	810	3.0	200
31,	9.0	15900	.....	.....	10.4	22900	.....	.....	4.4	1740	.....	.....	3.15	295	3.6	700	.....	.....

ESTIMATED MONTHLY DISCHARGE OF ALLEGHENY RIVER AT RED HOUSE, N. Y.

(Drainage area 1,640 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	15900	.....	2310	1.41	1.63
February,	.....	.....	2500	1.52	1.58
March,	30000	.....	5940	3.62	4.17
April,	19800	2240	8499	5.18	5.78
May,	22900	1170	5618	3.43	3.95
June,	1440	410	682	.416	.47
July,	455	200	346	.211	.24
August,	810	200	370	.226	.26
September,	865	200	385	.237	.27

KINZUA CREEK.

DESCRIPTION OF BASIN.

Kinzua Creek, a tributary of the Allegheny River in Warren County, drains an area of approximately one hundred and eighty square miles. Rising in the center of McKean County, it follows a general westerly direction through a rough, sparsely settled area, covered partly with second growth timber, very little farming being carried on along its course, to its mouth at Kinzua, Warren County, a distance of about 35 miles. The slope is steep and in general the stream flows in a deep, narrow valley between high mountain ridges. Of the many tributaries, the principal one is the South Branch. The headwaters of one of its tributaries are used for a water supply. The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge has been measured since October 23, 1909, at Dewdrop, approximately three miles above the mouth.

OHIO BASIN—STATION NO. 2.

KINZUA CREEK AT DEWDROP, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, steel, through-truss, highway bridge, 3 miles above the mouth.

RECORDS AVAILABLE—Discharge complete from November 1, 1909, to November 20, 1911, and July 22, 1912, to September 30, 1914.

DRAINAGE AREA—171 square miles.

GAGE—A standard chain gage is fastened to the downstream side of the bridge. The length of the chain from the bottom of the weight to the marker is 16.39 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is outer downstream corner of coping on left abutment, elevation 10.95 feet above gage datum. Bench Mark No. 2 is a square cut in stone on top of downstream end of right bridge seat, elevation 10.92 feet above gage datum. The gage is read once daily, except Sundays, by C. R. Morrison.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is top edge of left bridge seat.

CHANNEL—The channel is straight above and below the station for 300 feet and 600 feet respectively. Both banks overflow at extreme high stages. The bed is composed of rocks and gravel.

DISCHARGE MEASUREMENTS OF KINZUA CREEK AT DEWDROP, WARREN COUNTY, PA.

(Drainage area 171 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914.		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
17	April 6	Hosmer, ...	99	309	2.14	3.02	661	0.6 measurement.
18	Aug. 3	Wilson & Taylor, ...	37	25	1.64	0.96	41	Wading measurement 50' above bridge.

DISCHARGE TABLE FOR KINZUA CREEK AT DEWDROP, WARREN COUNTY, FROM JAN. 1, 1914.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
0.00	4	.70	168	.40	875	.10	2084	.80	3629
.10	6	.80	192	.50	938	.20	2169	.90	3724
.20	8	.90	218	.60	992	.30	2254	7.00	3819
.30	11	2.00	246	.70	1052	.40	2339	.10	3914
.40	15	.10	276	.80	1116	.50	2429	.20	4009
.50	20	.20	308	.90	1182	.60	2519	.30	4104
.60	26	.30	343	4.00	1248	.70	2609	.40	4199
.70	33	.40	381	.10	1316	.80	2699	.50	4299
.80	41	.50	423	.20	1384	.90	2789	.60	4399
.90	50	.60	467	.30	1454	6.00	2879	.70	4499
1.00	60	.70	513	.40	1524	.10	2969	.80	4604
.10	72	.80	563	.50	1599	.20	3059	.90	4714
.20	84	.90	608	.60	1674	.30	3154	8.00	4824
.30	98	3.00	654	.70	1754	.40	3249		
.40	113	.10	706	.80	1834	.50	3344		
.50	128	.20	762	.90	1914	.60	3439		
.60	146	.30	818	5.00	1999	.70	3534		

Note:—This table is only applicable subsequent to Jan. 1, 1914, and is based on two discharge measurements made during 1914, together with former curve.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF KINZUA CREEK AT DEWDROP, WARREN COUNTY, PA.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	1.38	109	†4.16	1360	.....	60	4.38	1510	2.60	467	1.41	114	0.90	50	0.70	33	0.90	50
2,	1.48	125	3.73	1070	.....	60	4.78	1820	2.50	423	1.40	112	0.98	53	0.70	33	1.95	223
3,	2.13	286	3.48	892	.....	60	4.08	1300	†2.45	402	1.30	98	0.95	55	0.90	50	2.10	276
4,	†2.56	449	4.13	1340	.....	60	3.66	1080	2.40	381	1.70	168	†0.93	53	0.81	42	1.80	192
5,	*	200	3.48	921	.....	60	†3.33	835	2.62	476	1.68	164	†0.92	53	0.70	33	1.40	112
6,	.....	200	3.18	751	.....	60	3.00	656	3.10	708	1.40	112	0.90	50	0.66	32	†1.26	93
7,	.....	200	3.06	698	.....	60	3.78	1100	2.80	558	†1.40	112	0.88	48	0.75	37	†1.12	74
8,	.....	200	†2.68	508	.....	60	5.58	2500	2.90	606	1.40	112	0.86	46	0.74	36	0.98	58
9,	.....	200	2.28	336	.....	60	4.42	1540	4.10	1320	1.35	105	0.85	46	†0.70	33	0.95	55
10,	.....	200	2.28	336	.....	60	3.98	1240	†3.75	1080	1.25	91	0.83	44	0.65	30	0.90	50
11,	.....	200	1.98	240	.....	60	4.08	1300	3.40	875	1.23	87	0.80	41	1.30	98	0.88	48
12,	.....	200	1.68	164	.....	60	†3.68	1040	5.30	2250	1.20	84	†0.90	50	1.10	72	0.85	46
13,	.....	200	3.78	1100	.....	60	3.28	807	6.40	3250	1.20	84	1.00	60	0.90	50	†0.82	43
14,	.....	200	3.06	698	.....	60	3.00	656	5.40	2340	†1.18	82	1.20	84	0.75	37	0.78	39
15,	.....	200	†2.90	606	.....	875	2.88	596	4.50	1600	1.15	78	1.10	72	0.70	33	0.77	39
16,	.....	200	*	145	.....	875	2.90	651	3.55	962	1.50	128	1.00	60	†0.70	33	0.76	38
17,	.....	200	.....	145	.....	875	2.48	415	3.00	656	1.00	60	1.00	60	0.70	33	0.75	37
18,	.....	200	.....	145	.....	875	1.98	240	2.10	276	1.00	60	1.50	128	1.20	84	0.74	36
19,	.....	200	.....	145	.....	875	†2.48	304	2.60	467	1.00	60	†1.30	84	0.90	50	0.73	35
20,	.....	200	.....	145	.....	875	2.88	596	2.46	381	1.00	60	0.90	50	0.90	50	†0.72	35
21,	.....	200	.....	145	.....	210	2.78	549	2.30	343	‡1.20	84	0.88	48	1.20	84	0.71	34
22,	.....	200	.....	145	.....	210	2.73	526	2.10	276	1.00	60	0.87	47	1.10	72	0.70	33
23,	.....	200	.....	145	.....	210	2.48	415	2.00	246	1.00	60	0.85	46	†1.45	120	0.70	33
24,	.....	200	.....	145	.....	210	2.33	354	†1.90	218	1.00	60	0.83	44	1.80	192	0.78	39
25,	.....	200	.....	145	.....	210	2.48	415	1.80	192	1.50	128	0.81	42	1.15	78	0.85	46
26,	.....	200	.....	145	.....	1000	‡3.28	807	1.70	168	1.40	112	†0.78	39	1.00	60	0.80	41
27,	.....	200	.....	145	4.78	1820	3.08	698	1.65	157	1.30	98	0.75	37	0.95	46	†0.88	43
28,	.....	600	.....	145	8.38	‡5220	2.78	549	1.62	150	†1.10	72	0.73	35	0.81	42	0.77	39
29,	.....	600	.....	.....	†6.98	3300	2.78	549	1.60	146	0.90	50	0.73	35	1.10	72	0.77	39
30,	4.58	1660	.....	.....	5.58	2500	2.58	458	‡1.75	180	0.90	50	0.72	35	†1.05	66	0.76	38
31,	4.60	1670	.....	.....	4.88	1900	.....	.....	‡1.50	128	.....	.....	0.72	35	1.00	60	.....	.....

*Creek frozen Jan. 5 to 29 inclusive; Feb. 16-Mar. 26 inclusive and discharge estimated from Brokenstraw Creek at Youngsville.
†Interpolated. ‡Estimated.

ESTIMATED MONTHLY DISCHARGE OF KINZUA CREEK AT DEWDROP, WARREN COUNTY, PA.

(Drainage area 171 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum	Minimum	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	1670	.....	326	1.906	2.197
February,	1360	.....	461	2.696	2.808
March,	‡5220	.....	754	4.409	5.083
April,	2500	240	852	4.982	5.558
May,	3250	‡128	699	4.088	4.713
June,	168	50	92	0.538	0.600
July,	128	35	53	0.310	0.357
August,	192	30	58	0.339	0.391
September,	276	33	66	0.386	0.431

Creek frozen Jan. 5 to 29 inclusive; Feb. 16-Mar. 26 inclusive, and discharge estimated from Brokenstraw Creek at Youngsville.
‡Estimated.

CONEWANGO CREEK.

DESCRIPTION OF BASIN.

Conewango Creek is one of the largest tributaries of the Allegheny River, draining a total area of approximately 825 square miles, 688 of which lie in New York State. Rising in the western part of Cattaraugus County, N. Y., it flows southwardly across the New York-Pennsylvania State line, in Warren County, about 10 miles west of where the Allegheny River crosses. Its source and all of its basin lie in the once glaciated region, abounding in lakes, ponds and marshes, the country being rolling and largely deforested, under cultivation and well inhabited. The valleys are broad and flat. The Chautauqua Lake in New York, lies on a tributary of Cassadoga Creek, and below its junction the valley is particularly flat, and the stream very sluggish.

The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge has been measured since October, 1909, at Frewsburg, New York.

OHIO BASIN—STATION NO. 3.

CONEWANGO CREEK AT FREWSBURG, N. Y.

DESCRIPTION OF STATION.

LOCATION—On single span, steel, through-truss, highway bridge, known as Whitman's Bridge, about 1 mile above Frewsburg, N. Y., and 18 miles above the mouth.

RECORDS AVAILABLE—Discharge measurements and gage heights from October 25, 1909, to September 30, 1914.

DRAINAGE AREA—690 square miles.

GAGE—A sectional chain gage is fastened to the railroad ties near the left abutment of the railroad bridge crossing the stream 75 feet upstream from the highway bridge. The length of chain from the bottom of the weight to the marker is 22.43 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is outer downstream corner of coping stone of left abutment, downstream wingwall, elevation 19.87 feet above gage datum. Bench Mark No. 2 is outer downstream corner of wingwall of left abutment on top of last step down from top, painted red, elevation 11.06 feet above gage datum. The gage is read once daily by Freeland P. Hobart.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the highway bridge and at railroad bridge during extreme floods, as the water passes around both ends of the highway bridge. The initial point for soundings is center handrail post, left end of bridge looking downstream.

CHANNEL—The channel above the station is straight for 75 feet to the railroad bridge, then makes a bend to the left. The channel below the station is straight for 600 feet. The right bank is a wide, low meadow and both banks overflow during high stages. The bed is composed of clay and gravel.

DISCHARGE MEASUREMENTS OF CONEWANGO CREEK AT FREWSBURG, N. Y.

(Drainage area 690 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914.		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
13	April 7	Hosmer, ...	157	1588	1.87	7.80	2965	0.6 method.
14	Aug. 4	Wilson & Taylor, ...	122	548	0.20	0.88	112	0.6 method.

DAILY MEAN GAGE HEIGHTS OF CONEWANGO CREEK AT FREWSBURG, N. Y.

1914. DAY.	JAN. G. H.	FEB. G. H.	MAR. G. H.	APR. G. H.	MAY. G. H.	JUNE. G. H.	JULY. G. H.	AUG. G. H.	SEPT. G. H.
1, ...	2.43	11.92	‡2.50	†13.21	3.74	3.04	1.27	0.86	1.69
2, ...	2.30	11.52	2.23	12.06	3.54	2.63	1.23	0.34	1.62
3, ...	2.30	10.30	2.41	11.73	3.44	2.52	1.22	0.39	1.54
4, ...	2.42	8.37	2.61	11.50	3.19	2.33	1.12	0.38	1.53
5, ...	2.48	6.87	2.44	10.75	4.04	2.98	1.02	0.33	1.48
6, ...	2.43	6.77	2.46	9.10	8.19	2.47	0.92	0.30	1.38
7, ...	2.48	6.52	2.57	7.80	8.47	2.38	0.89	0.25	1.35
8, ...	2.49	‡2.28	2.46	9.88	8.39	2.26	0.92	0.17	1.33
9, ...	2.68	4.03	‡2.38	10.90	8.74	2.13	0.91	0.20	1.28
10, ...	3.48	4.12	2.31	10.82	8.91	2.06	0.87	0.13	1.15
11, ...	3.58	4.02	2.86	10.32	8.91	1.93	0.82	0.23	1.00
12, ...	‡3.63	3.79	3.22	10.00	9.44	1.86	0.87	0.33	0.93
13, ...	3.68	3.52	3.18	9.35	11.89	1.84	1.02	0.30	0.90
14, ...	*3.76	3.42	3.21	8.50	12.47	1.72	0.95	0.41	0.87
15, ...	3.76	3.32	3.41	7.75	12.13	1.65	0.92	0.37	0.85
16, ...	3.68	3.27	3.71	7.67	11.79	1.48	0.98	0.32	0.83
17, ...	3.48	3.27	3.18	6.56	8.95	1.35	0.96	0.25	0.78
18, ...	3.28	3.26	9.31	6.30	7.19	1.22	0.91	0.41	0.69
19, ...	3.23	3.23	9.21	6.10	5.41	1.24	0.86	0.45	0.65
20, ...	3.23	3.17	8.41	6.00	4.39	1.53	0.76	0.35	0.65
21, ...	3.43	3.17	5.86	5.45	4.09	1.52	0.50	1.35	0.67
22, ...	3.79	3.02	5.16	5.30	3.84	1.46	0.56	1.34	0.65
23, ...	3.86	2.92	4.11	5.10	3.65	1.44	0.54	1.32	0.66
24, ...	4.28	‡2.84	4.21	4.65	3.49	1.38	0.54	1.53	0.70
25, ...	5.83	2.77	6.66	4.35	3.29	1.33	0.56	1.55	0.80
26, ...	5.43	2.77	9.36	4.90	3.11	1.26	0.58	1.68	0.87
27, ...	5.08	2.76	10.98	4.75	3.01	1.24	0.56	1.55	0.90
28, ...	7.98	2.72	14.08	4.67	2.95	1.33	0.54	1.35	0.93
29, ...	9.42	.....	14.44	4.20	2.90	1.28	0.52	1.80	0.96
30, ...	10.93	.....	13.98	4.08	2.82	1.26	0.48	2.32	0.90
31, ...	11.99	.....	13.44	.....	3.54	.....	0.44	1.85	.....

*Creek frozen Jan. 14-27 inclusive; Feb. 11-Mar. 8 inclusive. †Max. 13.51 at 7:45 a. m. ‡Interpolated.

BROKENSTRAW CREEK.

DESCRIPTION OF BASIN.

Brokenstraw Creek, a tributary of the Allegheny River, drains an area of approximately 324 square miles, 70 of which lie in New York State. Rising in Chautauqua County, New York, about five miles north of the Pennsylvania State line, it flows in a general southerly direction and enters Erie County, Pa., near its northeastern corner, and turning southeasterly passes into and through Warren County to its mouth at Irvineton, a distance of about 35 miles. This stream flows through a rolling, agricultural country, bordered by a wide valley, sparsely settled and considerably deforested. A few boroughs lie in the basin and some farming villages. The flow of this stream is not rapid, the source lying at an elevation of 1,720 feet and the mouth at 1,140 feet, the average slope per mile being 10 feet from the New York State line through Pennsylvania to its mouth. The upper watershed lies within the glacial area. There are many tributaries, Little Brokenstraw being the largest, and on the headwaters there are a few lakes, ponds and swamps. It is not used for water supply and very little power has been developed.

The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge of this creek has been measured since October 22, 1909, at Youngsville, Warren County, approximately 3 miles above its mouth.

OHIO BASIN—STATION NO. 4.

BROKENSTRAW CREEK AT YOUNGSVILLE, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, steel, through-truss, highway and trolley bridge at Youngsville, 3 miles above the mouth.

RECORDS AVAILABLE—Discharge complete from October 22, 1909, to September 30, 1914.

DRAINAGE AREA—290 square miles.

GAGE—A 14 foot staff gage is spiked to the face of the right abutment. The elevation of zero is arbitrary. Bench Mark No. 1 is ring cut in stone on top of upstream corner of right abutment on the outer edge near the date 1891 cut in stone, elevation 12.42 feet above gage datum. The gage is read twice daily by W. F. Schnell.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. Low water measurements taken by wading. The initial point for soundings is face of retaining wall under end of downstream handrail, right end.

CHANNEL—The channel above the station curves to the right looking upstream, and there is a riffle 300 feet above. The channel below the station is straight for 1,000 feet with a riffle 400 feet below. The right bank is high and does not overflow. The left bank overflows for a short distance under approach trestle at high stages. The bed is composed of clay and gravel, the section is deep and the current sluggish.

REMARKS—At approximately 10 feet gage height water leaves the regular creek channel about ¼ mile above the gaging station and discharges through a flood channel to the west. Since the quantity of water flowing in the flood channel is unknown at the present time, discharges above gage height 10.0 feet have not been published.

DISCHARGE MEASUREMENTS OF BROKENSTRAW CREEK AT YOUNGSVILLE, WARREN COUNTY, PA.

(Drainage area 290 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914.		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
17	April 8	Hosmer, ...	129	882	3.37	4.61	2976	Surface measurement.
18	Aug. 5	Wilson & Taylor, ...	85	382	0.12	−0.24	46	0.2 and 0.8 measurement.

DISCHARGE TABLE FOR BROKENSTRAW CREEK AT YOUNGSVILLE, WARREN COUNTY, FROM JAN. 1, 1913.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
—.30	30	.60	437	.50	1765	.40	3775	.30	6790
—.20	35	.70	486	.60	1855	.50	3905	.40	6960
—.10	40	.80	537	.70	1945	.60	4040	.50	7130
0.00	50	.90	592	.80	2035	.70	4175	.60	7300
.10	60	2.00	650	.90	2130	.80	4315	.70	7475
.20	71	.10	710	4.00	2225	.90	4460	.80	7650
.30	83	.20	775	.10	2325	6.00	4610	.90	7825
.40	97	.30	840	.20	2425	.10	4765	8.00	8000
.50	113	.40	905	.30	2525	.20	4925	.10	8175
.60	131	.50	975	.40	2630	.30	5090	.20	8350
.70	151	.60	1045	.50	2735	.40	5260	.30	8525
.80	173	.70	1120	.60	2840	.50	5430	.40	8700
.90	197	.80	1195	.70	2950	.60	5600	.50	8875
1.00	223	.90	1270	.80	3060	.70	5770	.60	9050
.10	251	3.00	1350	.90	3175	.80	5940	.70	9225
.20	282	.10	1430	5.00	3290	.90	6110	.80	9400
.30	316	.20	1510	.10	3405	7.00	6280	.90	9575
.40	353	.30	1595	.20	3525	.10	6450	9.00	9750
.50	393	.40	1680	.30	3650	.20	6620		

Note:—This table is only applicable subsequent to Jan. 1, 1913, and is based on two discharge measurements made in 1913, together with former curve.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF BROKENSTRAW CREEK AT YOUNGSVILLE, WARREN COUNTY, PA.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis	G H	Dis.	G H	Dis.
1,	0.55	122	4.40	2630	.....	100	2.40	905	1.15	266	0.55	122	0	50	—.20	35	0	50
2,	0.50	113	3.20	1510	.....	100	2.80	1200	1.00	223	0.45	105	—.10	40	—.25	32	0	50
3,	0.50	113	2.35	872	.....	100	3.60	1860	1.00	223	0.40	97	—.10	40	—.25	32	.10	60
4,	0.75	162	2.90	1270	.....	100	3.30	1600	1.00	223	0.40	97	—.10	40	—.25	32	.05	55
5,	0.65	141	2.40	905	.....	100	2.30	840	1.50	393	0.35	90	—.10	40	—.30	30	0	50
6,	0.60	131	1.90	592	.....	100	2.00	650	2.80	1200	0.35	90	—.10	40	—.30	30	—.10	40
7,	0.65	141	1.65	461	.....	100	2.20	775	2.40	905	0.30	83	—.10	40	—.30	30	—.10	40
8,	0.70	151	*	250	.....	100	4.47	2700	1.75	485	0.25	77	—.10	40	—.30	30	—.10	40
9,	0.80	173	.....	250	.....	100	4.30	2520	1.35	334	0.20	71	—.10	40	—.30	30	—.15	38
10,	0.95	210	.....	250	.....	100	3.50	1760	1.00	223	0.10	66	—.10	40	—.30	30	—.15	38
11,	*	150	.....	250	.....	100	3.10	1430	1.25	299	0.10	60	—.15	38	—.30	30	—.20	35
12,	.....	150	.....	250	.....	100	3.00	1350	4.20	2420	0.10	60	—.20	35	—.10	40	—.20	35
13,	.....	150	.....	250	.....	100	2.90	1270	5.20	3520	0	50	—.20	35	—.10	40	—.20	35
14,	.....	150	.....	250	0.50	113	2.20	775	3.55	1760	0	50	—.05	45	—.10	40	—.20	35
15,	.....	150	.....	250	1.40	353	1.60	437	2.60	1040	0	50	0	50	—.20	35	—.20	35
16,	.....	150	.....	250	2.80	1200	2.90	1270	1.60	437	0	50	—.10	40	—.20	35	—.25	32
17,	.....	150	.....	250	3.95	2180	2.10	710	1.00	223	—.05	45	—.10	40	—.30	30	—.30	30
18,	1.00	223	.....	250	5.10	3400	1.95	631	0.90	197	—.10	40	—.10	40	—.20	35	—.30	30
19,	1.05	237	.....	250	3.90	2130	1.80	537	0.90	197	0	50	—.20	35	—.20	35	—.30	30
20,	1.15	266	.....	250	3.00	650	1.70	485	0.75	162	0	50	—.20	35	—.25	32	—.30	30
21,	1.25	299	.....	250	1.55	415	1.45	393	0.55	122	0	50	—.20	35	—.10	40	—.30	30
22,	1.40	353	.....	250	1.35	334	1.30	316	0.45	105	0	50	—.20	35	.10	60	—.30	30
23,	1.50	393	.....	250	1.20	282	1.30	316	0.40	97	0	50	—.20	35	.20	71	—.30	30
24,	1.75	511	.....	250	1.40	353	1.20	282	0.40	97	0	50	—.20	35	.10	60	—.30	30
25,	1.65	461	.....	250	1.50	398	1.40	353	0.40	97	0	50	—.20	35	0	50	—.25	32
26,	1.75	511	.....	250	4.65	2900	2.90	1270	0.40	97	0	50	—.20	35	—.10	40	—.25	32
27,	1.95	621	.....	250	6.00	4610	2.40	905	0.40	97	0	50	—.20	35	—.10	40	—.25	32
28,	3.30	1600	.....	250	8.50	8880	1.75	511	0.40	97	0	50	—.20	35	—.10	40	—.20	35
29,	5.20	3520	.....	.....	6.20	4920	1.45	373	0.40	97	0	50	—.20	35	—.10	40	—.20	35
30,	6.85	6020	.....	.....	4.50	2740	1.30	316	0.95	210	0	50	—.20	35	—.10	40	—.20	35
31,	6.60	5600	.....	.....	3.20	1510	.....	.....	0.75	162	.....	.....	—.20	35	0	50	.....	.....

*Creek frozen Jan 11-17 inclusive; Feb.8-Mar. 13 inclusive and discharge estimated from climatological records.

ESTIMATED MONTHLY DISCHARGE OF BROKENSTRAW CREEK AT YOUNGSVILLE, WARREN COUNTY, PA.

(Drainage area 290 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum	Minimum	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	6020		746	2.572	2.965
February,	2630		482	1.663	1.731
March,	8880		1250	4.310	4.969
April,	2700	282	957	3.300	3.682
May,	3520	97	516	1.779	2.051
June,	122	40	63	0.217	0.242
July,	50	35	38	0.131	0.151
August,	71	30	39	0.134	0.154
September,	60	30	37	0.128	0.143

Creek frozen Jan. 11-17 inclusive; Feb. 8-Mar. 13 inclusive. Discharge estimated from climatological records.

TIONESTA CREEK.

DESCRIPTION OF BASIN.

Tionesta Creek, one of the large tributaries of the Allegheny River, drains approximately 485 square miles in Warren, McKean and Forest counties. The main stream rises on the west slope of the Allegheny Mountains in the southcentral part of Warren County, and flows in a northeasterly direction for approximately 13 miles to Clarendon, Warren County, where it turns and flows in a general southerly direction for approximately 13 miles to the Warren-Forest county line, thence flowing in a general southwesterly direction for approximately 32 miles to its mouth in the Allegheny River at Tionesta, Forest County, a total distance of approximately 58 miles.

The valley of the stream near its headwaters is fairly broad, the creek flowing through low, marshy land, but after it leaves Sheffield, it enters a gorge-like valley with the hills rising 500 feet to 600 feet on either side, to its mouth. The valleys in the lower reaches are farmed to a small extent, while on the adjoining hills is some virgin and second-growth timber. A large portion of the high ground is under cultivation.

There is considerable lumbering carried on in its drainage basin, and there are several saw mills along the course of the stream and its tributaries. There are also several small water power installa-

tions along this stream, some of which, however, have been abandoned. It is proposed to erect a 300-foot dam near the mouth of the creek, in connection with a proposed hydro-electric power plant, which will back water up almost to Sheffield.

The elevation of the creek at Saybrook, at the mouth of Four-Mile Run, 18 miles below its source, is 1348 feet above mean sea level, while at its mouth at Tionesta it is 1044 feet above mean sea level, a fall of 304 feet in a distance of approximately 40 miles, or at the rate of 7½ feet per mile.

There are no large streams entering the creek, although there are numerous small tributaries from the east and west. Several of the tributaries above Sheffield and Clarendon come from wooded hills, and are clear and pure.

The largest communities in its watershed are Nebraska, Sheffield, Clarendon, none of which, however, are of any considerable size.

The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge has been measured since July 26, 1912, at Butler Bridge, about 2 miles above Nebraska, Forest County, Pa.

OHIO BASIN—STATION NO. 5.

TIONESTA CREEK AT BUTLER BRIDGE, PA.

DESCRIPTION OF STATION.

LOCATION—On three span bridge, 2 deck spans and one through-truss steel span, about 2 miles above Nebraska, Forest County.

RECORDS AVAILABLE—Discharge measurements and gage heights from July 26, 1912, to September 30, 1914.

DRAINAGE AREA—420 square miles.

GAGE—A sectional chain gage is fastened to the face of the wooden guard-rail. The length of chain from the bottom of the weight to the marker is 32.77 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is a cross chiseled on the downstream side of the right pier, marked B. M. and W. S. C. of Pa., elevation 17.77 feet above gage datum. The gage is read once daily by Mrs. P. S. Moore.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is right end of downstream handrail.

CHANNEL—The channel is straight for 200 feet above and 1,500 feet below the station. Both banks are high, not subject to overflow, and wooded. The bed is composed of gravel and boulders.

REMARKS—The creek flows under through-truss steel span, except during extreme floods.

DISCHARGE MEASUREMENTS OF TIONESTA CREEK AT BUTLER BRIDGE, FOREST COUNTY, PA.

(Drainage area 420 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914.		Feet	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
3	April 9	Hosmer, ...	147	849	4.53	7.28	3849	Surface measurement.
4	Aug. 6	Wilson & Taylor, ...	90	70	0.60	3.16	42	Wading 800' above bridge.

DAILY MEAN GAGE HEIGHTS OF TIONESTA CREEK AT BUTLER BRIDGE, FOREST COUNTY, PA.

1914. DAY.	JAN. G. H.	FEB. G. H	MAR. G. H.	APR. G. H.	MAY. G. H.	JUNE. G. H.	JULY. G. H.	AUG. G. H.	SEPT. G. H.
1, ...	4.80	7.39	5.58	6.78	4.86	3.94	3.62	3.20	3.36
2, ...	4.60	6.59	5.48	6.98	4.76	3.94	3.42	3.20	4.26
3, ...	*4.60	5.99	5.38	6.58	4.46	3.84	3.42	3.30	4.56
4, ...	4.60	6.29	5.38	5.68	4.56	4.04	3.42	3.10	3.96
5, ...	4.60	6.29	5.48	5.08	5.46	4.04	3.42	3.20	3.56
6, ...	4.60	5.79	5.48	5.38	5.76	3.94	3.42	3.19	3.56
7, ...	5.00	5.39	5.38	7.68	5.26	3.84	3.32	3.16	3.56
8, ...	5.00	5.19	5.38	6.98	5.16	3.74	3.32	3.16	3.36
9, ...	4.90	4.79	5.38	6.98	5.46	3.64	3.22	3.16	3.36
10, ...	5.00	*7.79	5.18	6.08	5.36	3.64	3.22	3.16	3.36
11, ...	5.00	7.49	5.18	5.88	5.36	3.64	3.32	3.26	3.36
12, ...	5.00	6.69	5.28	6.06	7.86	3.54	3.32	3.36	3.16
13, ...	5.00	6.69	6.28	5.78	9.46	3.54	3.33	3.36	3.26
14, ...	5.00	6.69	5.28	5.38	7.36	3.54	3.42	3.26	3.26
15, ...	5.10	6.69	6.48	5.18	6.66	3.34	3.52	3.36	3.36
16, ...	5.10	6.69	6.38	6.08	5.96	3.34	3.52	3.16	3.36
17, ...	5.10	6.69	7.28	5.78	5.56	3.34	3.32	3.26	3.16
18, ...	5.10	6.39	7.68	5.38	5.16	3.44	3.33	3.26	3.16
19, ...	5.10	6.29	7.18	5.38	4.96	3.44	3.32	3.26	3.16
20, ...	5.10	6.29	6.48	5.38	4.76	3.44	3.22	3.26	3.16
21, ...	5.10	6.09	5.98	5.28	4.66	3.44	3.22	3.26	3.16
22, ...	5.10	6.09	5.98	5.08	4.46	3.94	3.22	3.36	3.16
23, ...	5.20	5.99	5.98	5.08	4.36	4.04	3.22	3.26	3.16
24, ...	5.60	5.89	5.78	4.78	4.26	3.74	3.12	3.86	3.26
25, ...	5.70	5.79	5.68	4.88	4.16	3.64	3.22	3.66	3.16
26, ...	5.60	5.69	12.73	6.98	4.06	3.54	3.22	3.36	3.16
27, ...	5.80	5.69	7.98	6.38	4.06	3.44	3.22	3.26	3.26
28, ...	6.00	5.49	10.83	5.78	4.26	3.44	3.22	3.26	3.26
29, ...	7.50	.....	9.78	5.48	4.56	3.64	3.12	3.36	3.26
30, ...	8.00	.....	8.28	5.28	4.76	3.54	3.22	3.26	3.26
31, ...	7.00	.....	7.48	.....	4.26	.....	3.22	3.36	.....

*Creek frozen Jan. 3 to 29 inclusive; Feb. 10-Mar. 26 inclusive, with gorge below gage on Mar. 26.

OIL CREEK.

DESCRIPTION OF BASIN.

Oil Creek, a tributary of the Allegheny River, drains an approximate area of 335 square miles in Erie, Crawford, Warren and Venango counties. It rises in Oil Creek Lake, Crawford County, which is fed by numerous streams and runs heading in Erie County; the East Branch of Oil Creek rising in a large lake at Spartansburg, Crawford County, is also fed by numerous streams rising in Erie County. These two streams join at Centerville, Crawford County, the creek proper having a fall of 116 feet in a distance of 6 miles, while the East Branch has a fall of 150 feet in eight miles. From the junction of these streams Oil Creek flows in a general southerly direction through Crawford and Venango counties to its mouth at Oil City, a distance of 30 miles. From Centerville (elevation 1,275) to Oil City (elevation 985), the fall of the creek is at a uniform rate of 10 feet per mile. There are many tributaries, none, however, of any considerable size. The valley of Oil Creek is wide and flat, the hills rising abruptly and often with cliffs, from its flood plain. Its upper section lies in the glacial area. The valley is underlain with productive oil fields, farming and oil production being carried on throughout the basin. Its valley is largely deforested, and along its course lie numerous large boroughs and villages. The stream is used extensively for industrial water supply but no domestic supplies are obtained from it.

The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge has been measured since October 20, 1909, at Rouseville, about two and one-half miles above the mouth.

OHIO BASIN—STATION NO. 6.

OIL CREEK AT ROUSEVILLE, PA.

DESCRIPTION OF STATION.

LOCATION—On two span, steel, through-truss, highway bridge, ½ mile below Rouseville, and 2½ miles above the mouth.

RECORDS AVAILABLE—Discharge complete from October 20, 1909, to September 30, 1914.

DRAINAGE AREA—330 square miles.

GAGE—A standard chain gage is attached to the handrail on the downstream side of the bridge in the right span. The length of chain from the bottom of the weight to the marker is 22.37 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is top corner at upstream end of stone in bottom course at downstream corner of right abutment, elevation 1.46 feet above gage datum. Bench Mark No. 2 is bottom of iron bed-plate on right abutment, downstream truss, elevation 15.76 feet above gage datum. Bench Mark No. 3 is chiseled rod seat on second stone in from end, downstream side of right abutment, eighth course down from bridge seat, elevation 5.30 feet above gage datum. The gage is read once daily by C. H. Wright.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge and by wading at extreme low stages. The initial point for soundings is top edge of right bridge seat.

CHANNEL—The channel is straight and the flow quiet for 200 feet above bridge. The channel below is straight for 1,000 feet. The right bank overflows in extreme floods, and the left bank is high and does not overflow. The bed is composed of gravel, and is clean.

DISCHARGE MEASUREMENTS OF OIL CREEK AT ROUSEVILLE, VENANGO COUNTY, PA.

(Drainage area 330 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914.		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
22	April 8	Hosmer, ...	182	1025	4.13	4.41	4229	Surface msmt.
23	Aug. 5	Wilson & Taylor, ...	97	64	0.86	0.70	55	0.6 msmt. Wading msmt.

DISCHARGE TABLE FOR OIL CREEK AT ROUSEVILLE, VENANGO COUNTY, FROM OCT. 20, 1909.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
0.40	33	.60	420	.80	2000	4.00	4080	.20	6580
.50	45	.70	495	.90	2170	.10	4260	.30	6820
.60	60	.80	550	3.00	2340	.20	4450	.40	7060
.70	77	.90	675	.10	2510	.30	4640	.50	7300
.80	96	2.00	780	.20	2680	.40	4840	.60	7540
.90	118	.10	900	.30	2850	.50	5040	.70	7780
1.00	145	.20	1020	.40	3020	.60	5240	.80	8240
.10	176	.30	1170	.50	3195	.70	5460	.90	8540
.20	210	.40	1320	.60	3370	.80	5680	6.00	8840
.30	255	.50	1490	.70	3545	.90	5900		
.40	300	.60	1660	.80	3720	5.00	6120		
.50	355	.70	1830	.90	3900	.10	6340		

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF OIL CREEK AT ROUSEVILLE, VENANGO COUNTY, PA.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	1.30	255	2.70	3540	.....	100	2.30	1170	2.60	1660	0.95	132	.85	107	.55	52	.80	96
2,	1.20	210	2.70	1830	.....	100	3.20	2680	2.00	780	0.90	118	.70	77	.50	45	1.00	145
3,	1.30	255	2.60	1660	.....	100	2.80	2000	1.60	420	0.85	107	.75	86	.55	52	1.20	210
4,	1.10	175	3.40	3020	.....	100	2.40	1320	1.50	355	0.90	118	.70	77	.50	45	1.10	175
5,	1.30	255	2.60	1660	.....	100	2.20	1080	1.90	675	1.05	160	.75	86	.63	65	1.00	145
6,	*	200	2.20	1080	.....	* 100	2.00	780	3.30	2850	1.15	192	.75	86	.65	68	1.00	145
7,	.....	200	2.20	1080	.....	100	2.30	1170	2.70	1830	1.00	146	.70	77	.70	77	.70	77
8,	.....	200	2.00	780	.....	100	4.40	4840	2.40	1320	.95	132	.65	68	.70	77	.70	77
9,	.....	200	1.70	495	.....	100	3.40	3020	2.70	1830	.90	118	.70	77	.70	77	.70	77
10,	.....	200	1.80	580	.....	100	3.10	2510	2.10	900	.85	107	.75	86	.70	77	.60	60
11,	.....	200	1.60	420	.....	100	3.00	2340	2.00	780	.85	107	.65	68	.80	96	.60	60
12,	.....	200	1.10	175	.....	100	2.80	2000	4.60	5240	.80	96	.60	60	.80	96	.70	77
13,	.....	200	1.10	175	.....	100	2.20	1080	4.70	5460	.85	107	.75	86	.80	96	.70	77
14,	.....	200	1.20	210	.....	100	2.00	780	3.10	2510	.80	96	.80	96	.70	77	.60	60
15,	.....	200	1.40	300	.....	100	2.30	1170	2.80	2000	.85	107	.85	107	.70	77	.60	60
16,	.....	200	1.20	210	.....	100	2.80	2000	2.30	1170	.75	86	.85	107	.70	77	.60	60
17,	.....	200	*	200	3.30	2850	2.40	1320	2.00	780	70	77	.70	77	.70	77	.60	60
18,	.....	200	.....	200	3.20	2680	2.20	1080	1.80	580	.75	86	.75	86	.70	77	.60	60
19,	.....	200	.....	200	2.80	2000	2.00	780	1.70	495	.80	96	.70	77	.70	77	.60	60
20,	.....	200	.....	200	2.60	1660	2.20	1080	1.70	495	85	107	.65	68	.70	77	.60	60
21,	.....	675	.....	200	2.20	1080	1.90	675	1.60	420	.75	86	.65	68	.80	96	.60	60
22,	.....	675	.....	200	2.00	780	1.70	495	1.50	355	1.20	210	.60	60	.70	77	.60	60
23,	.....	675	.....	200	2.00	780	1.60	420	1.50	355	1.15	192	.65	68	.70	77	.50	45
24,	.....	675	.....	200	1.90	675	1.50	355	1.40	300	1.20	210	.60	60	1.00	145	.60	60
25,	.....	675	.....	200	2.10	900	1.70	495	1.30	255	1.45	328	.55	52	.70	77	.60	60
26,	.....	675	.....	200	3.70	3540	4.00	4080	1.10	175	1.05	160	.55	52	.70	77	.60	60
27,	.....	675	.....	200	3.90	3900	3.70	3540	1.10	175	.80	96	.50	45	.70	77	.60	60
28,	.....	675	.....	200	5.40	7080	3.30	2850	1.00	145	.95	132	.55	52	.70	77	.50	45
29,	4.00	4080	.....	.....	4.20	4450	3.00	2340	1.00	145	.80	96	.60	60	.80	96	.50	45
30,	5.20	6580	.....	.....	3.30	2850	2.90	2170	1.20	210	.85	107	.55	52	.80	96	.50	45
31,	4.00	4080	.....	.....	2.70	1830	.....	.....	1.00	145	.....	.....	.50	46	.70	77	.....	.....

*Creek frozen Jan. 6 to 28 inclusive, and Feb. 17 to Mar. 16 inclusive, and discharge estimated from climatological records.

ESTIMATED MONTHLY DISCHARGE OF OIL CREEK AT ROUSEVILLE, VENANGO COUNTY, PA.

(Drainage area 330 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum	Minimum	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	6580	.....	784	2.376	2.739
February,	3540	.....	697	2.112	2.199
March,	7080	.....	1240	3.758	4.333
April,	4840	355	1710	5.182	5.781
May,	5460	145	1120	3.394	3.913
June,	328	77	130	0.394	0.439
July,	107	45	73	0.221	0.255
August,	145	45	79	0.239	0.276
September,	210	45	79	0.239	0.267

Creek frozen Jan. 6 to 28 inclusive, and Feb. 17 to Mar. 16 inclusive, and discharge estimated from climatological records.

NORTH BRANCH OF FRENCH CREEK.

DESCRIPTION OF BASIN.

The North Branch of French Creek, the largest tributary of French Creek, rises in the southwestern corner of New York State, in numerous tributaries, draining an area of approximately 217 square miles, 114 of which lie in New York State, and flows in a general westerly direction into Erie County, Pa. and thence continues in a general southerly direction to its junction with the South Branch, at Leboeuf, Erie County, a distance of approximately 30 miles, the entire watershed lying north of the terminal morain.

The headwaters of this stream flow through broad, flat valleys, the side hills being low and rolling and covered with second growth timber. There are a few small lakes and swampy areas at the headwaters, the largest lake being Findley Lake, in New York State, near the New York-Pennsylvania state line. As the stream approaches its confluence with the South Branch the hills become higher and the fall greater. Throughout the entire course it flows through a well populated, agricultural region. There are numerous small towns and boroughs in the watershed, the largest of which is Wattsburg.

The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge of the stream has been measured since May 4, 1910, at Kimmeytown, about six miles above its mouth.

OHIO BASIN—STATION NO. 7.

NORTH BRANCH FRENCH CREEK AT KIMMEYTOWN, PA.

DESCRIPTION OF STATION.

LOCATION—On steel highway bridge at Kimmeytown, 5 miles above the mouth of the creek.

RECORDS AVAILABLE—Discharge complete from May 16, 1910, to September 30, 1914.

DRAINAGE AREA—190 square miles.

GAGE—A standard chain gage is attached to the downstream hand-rail. The length of chain from the bottom of the weight to the marker is 19.95 feet. The elevation of zero is 1235.7 feet above sea level. Bench Mark No. 1 is on west abutment, downstream side, top of caisson, elevation 1250.09 feet above sea level. The gage is read twice daily by Mrs. J. L. Carter.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge and by wading at a section 200 feet above bridge at extremely low stages. The initial point for soundings is outer face of caisson at left end of bridge.

CHANNEL—The channel above and below the station is straight for 300 feet and 600 feet respectively. Both banks are subject to overflow at extremely high stages. The bed is composed of gravel.

DISCHARGE MEASUREMENTS OF NORTH BRANCH FRENCH CREEK AT KIMMEYTOWN, ERIE COUNTY, PA.

(Drainage area 190 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
14	1914. Aug. 4	Wilson & Taylor, ...	50	48	0.54	0.57	26	Wading measurement.

DISCHARGE TABLE FOR NORTH BRANCH FRENCH CREEK AT KIMMEYTOWN, ERIE COUNTY, FROM MAY 16, 1910.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
0.60	26	.10	414	.60	1120	.10	2060	.60	3320
.70	32	.20	450	.70	1180	.20	2140	.70	3420
.80	46	.30	490	.80	1240	.30	2220	.80	3520
.90	64	.40	530	.90	1300	.40	2300	.90	3630
1.00	86	.50	572	4.00	1360	.50	2380	7.00	3740
.10	108	.60	616	.10	1420	.60	2460	.10	3850
.20	132	.70	662	.20	1480	.70	2540	.20	3970
.30	160	.80	710	.30	1540	.80	2620	.30	4090
.40	188	.90	760	.40	1600	.90	2700	.40	4210
.50	216	3.00	810	.50	1660	6.00	2780	.50	4340
.60	246	.10	860	.60	1720	.10	2870	.60	4470
.70	276	.20	910	.70	1780	.20	2960	.70	4600
.80	310	.30	960	.80	1850	.30	3050		
.90	344	.40	1010	.90	1920	.40	3140		
2.00	378	.50	1060	5.00	1990	.50	3230		

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF NORTH BRANCH FRENCH CREEK AT KIMMEYTOWN, ERIE COUNTY, PA.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	1.52	222	¶4.07	1400	.....	65	4.11	1430	1.72	283	0.92	68	0.82	50	0.62	27	1.00	86
2,	1.42	194	3.22	920	.....	65	5.21	2150	1.62	252	0.92	68	0.82	50	¶0.62	27	0.90	64
3,	1.52	222	2.92	770	.....	65	5.81	2630	¶1.47	208	0.92	68	0.82	50	0.62	27	0.90	64
4,	¶2.52	581	3.42	1020	.....	65	4.31	1550	1.32	166	1.12	113	0.82	50	0.60	26	0.90	64
5,	3.52	1070	2.72	672	.....	65	¶3.76	1230	2.12	421	1.22	138	¶0.77	42	0.50	20	0.80	46
6,	3.22	920	*	350	.....	65	3.21	915	5.62	2480	1.12	113	0.72	35	0.50	20	¶0.80	46
7,	3.12	870	.....	350	.....	65	3.21	915	3.92	1310	¶1.06	97	0.72	35	0.50	20	0.80	46
8,	2.82	720	.....	165	.....	65	6.11	2880	2.72	672	¶0.99	84	0.72	35	0.50	20	0.70	32
9,	2.02	386	.....	165	.....	65	4.91	1930	2.92	770	0.92	68	0.62	27	¶0.50	20	0.70	32
10,	2.32	498	.....	165	.....	65	4.61	1730	¶2.67	603	0.82	50	0.62	27	0.50	20	0.70	32
11,	2.82	720	.....	165	.....	65	3.71	1190	2.22	458	0.82	50	0.62	27	0.60	26	0.60	26
12,	2.82	720	.....	165	.....	65	¶3.91	1310	5.97	2760	0.82	50	¶0.67	30	0.65	29	0.60	26
13,	3.92	1310	.....	165	.....	65	4.11	1430	7.72	§4620	0.82	50	0.72	35	0.50	20	¶0.55	23
14,	3.92	1310	.....	165	.....	630	3.31	965	5.72	2560	0.72	35	0.82	50	¶0.55	23	0.50	20
15,	3.72	1190	.....	165	.....	630	2.71	667	3.42	1020	0.72	35	0.92	68	0.60	26	0.50	20
16,	3.62	1130	.....	165	.....	630	2.91	765	2.42	538	0.62	27	0.72	35	¶0.55	23	0.50	20
17,	3.52	1070	.....	165	.....	630	3.11	865	¶2.17	439	0.62	27	0.62	27	0.50	20	0.50	20
18,	¶3.42	1020	.....	165	6.21	2970	2.81	715	1.92	351	0.62	27	0.62	27	0.60	26	0.50	20
19,	*	270	.....	165	3.41	1020	¶2.61	621	1.62	252	¶0.77	42	¶0.57	24	0.60	26	0.60	26
20,	.....	270	.....	165	2.91	765	2.41	534	1.52	222	0.92	68	0.52	21	0.70	32	¶0.60	26
21,	.....	270	.....	165	2.61	621	2.21	454	1.42	194	¶0.97	79	0.62	27	0.80	46	0.60	26
22,	.....	270	.....	165	¶2.41	534	2.11	418	1.42	194	1.02	90	0.52	21	0.90	64	0.50	20
23,	.....	270	.....	165	2.21	454	2.01	382	1.32	166	0.72	35	0.52	21	¶0.90	64	0.50	20
24,	.....	270	.....	165	2.11	418	1.91	347	¶1.32	166	0.72	35	0.62	27	0.90	64	0.60	26
25,	.....	270	.....	165	2.31	494	1.91	347	1.32	166	0.72	35	0.62	27	1.20	132	0.60	26
26,	.....	270	.....	165	6.56	3280	¶2.11	418	1.32	166	0.82	50	¶0.62	27	1.00	86	0.60	26
27,	.....	270	.....	165	7.11	3860	2.31	494	1.22	138	0.72	35	0.62	27	0.80	46	¶0.60	26
28,	.....	1060	.....	165	‡10.41	§9010	2.01	382	1.22	138	0.82	50	0.62	27	0.70	32	0.60	26
29,	6.22	2980	.....	.....	¶7.41	4220	1.81	313	1.12	113	0.82	50	0.62	27	0.70	32	0.60	26
30,	8.12	§5180	.....	.....	4.41	1610	1.81	313	1.22	138	0.82	50	0.62	27	¶1.00	86	0.50	20
31,	4.92	1930	.....	.....	4.01	1370	.....	.....	¶1.07	101	.....	.....	0.52	21	1.80	160	.....	.....

*Creek frozen Jan. 19 to 28 inclusive; Feb. 8 to Mar. 17 inclusive and discharge estimated from Brokenstraw Creek at Youngsville. ‡Max. 10.81 at 1 p. m.—§9710 sec. ft. ¶Interpolated. §Estimated.

ESTIMATED MONTHLY DISCHARGE OF NORTH BRANCH FRENCH CREEK AT KIMMEYTOWN, ERIE COUNTY, PA.

(Drainage area 190 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum	Minimum	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	*5180	194	894	4.705	5.425
February,	1400	.....	319	1.679	1.748
March,	*9710	.....	1100	5.789	6.674
April,	2880	313	1010	5.316	5.981
May,	*4620	101	712	3.747	4.320
June,	138	27	60	0.316	0.353
July,	68	21	33	0.174	0.201
August,	160	20	42	0.221	0.255
September,	86	20	33	0.174	0.194

Creek frozen Jan. 19 to 8 inclusive, Feb. 6 to 17 inclusive, and discharge estimated from Broken-straw Creek at Youngsville.
*Estimated.

CUSSEWAGO CREEK.

DESCRIPTION OF BASIN.

Cussewago Creek, one of the largest tributaries of French Creek, draining ninety-two square miles, rises in the southern part of Erie County and flows in a general southerly direction, through Erie and Crawford counties, for a distance of about twenty miles to the parent stream opposite Meadville. This creek follows a tortuous course and the flow is sluggish throughout its entire length, passing through a wild, shallow, drift filled valley, the side hills of which often rise abruptly from the plains, with numerous small tributaries coming in from the east and west. The watershed lies entirely within the glacial area, the hills being low, rolling and largely deforested, while the basin is well populated by an agricultural community.

The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge of this creek has been measured since May 2, 1910, at Jone's Farm, above Meadville, Crawford County.

OHIO BASIN—STATION NO. 8.

CUSSEWAGO CREEK NEAR MEADVILLE, PA.

DESCRIPTION OF STATION.

LOCATION—On steel, highway bridge, near Jones' Farm, 4.5 miles above Meadville, and 4.5 miles above the mouth of the creek.

RECORDS AVAILABLE—Discharge complete from May 3, 1910, to September 30, 1914.

DRAINAGE AREA—90 square miles.

GAGE—A chain gage is attached to the bridge. The length of chain from the bottom of the weight to the marker is 14.86 feet. The elevation of zero is 1071.77 feet above sea level. Bench Mark No. 1 is on top of upstream side of left abutment, elevation 1085.4 feet above sea level. The gage is read twice daily by J. E. Hofius.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is outer edge of left abutment.

CHANNEL—The channel above and below the station bends slightly to the left. Both banks are subject to overflow at gage height of about 8 feet. The bed is soft and subject to change.

DISCHARGE MEASUREMENTS OF CUSSEWAGO CREEK NEAR MEADVILLE, CRAWFORD COUNTY, PA.

(Drainage area 90 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1911.		Feet.	Sq. ft.	Ft. p. r sec.	Feet.	Sec. ft.	
13	Aug. 8	Wilson & Taylor, ...	1	2.61	0.47	0.19	0.95	Wading measurement.

DISCHARGE TABLE FOR CUSSEWAGO CREEK NEAR MEADVILLE, CRAWFORD COUNTY, FROM MAY 3, 1910.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
0.50	2	.50	48	.50	154	.50	304	.50	590
.60	3	.60	48	.60	160	.60	314	.60	620
.70	4	.70	53	.70	166	.70	324	.70	641
.80	5	.80	58	.80	172	.80	335	.80	662
.90	6	.90	63	.90	179	.90	346	.90	686
1.00	7	3.00	68	5.00	186	7.00	357	9.00	709
.10	8	.10	73	.10	193	.10	368	.10	732
.20	9	.20	78	.20	200	.20	380	.20	756
.30	10	.30	83	.30	207	.30	392	.30	780
.40	12	.40	88	.40	214	.40	405	.40	806
.50	14	.50	94	.50	221	.50	419	.50	832
.60	16	.60	100	.60	228	.60	434	.60	861
.70	18	.70	106	.70	236	.70	450	.70	890
.80	20	.80	112	.80	244	.80	466	.80	920
.90	23	.90	118	.90	252	.90	483	.90	950
2.00	26	4.00	124	6.00	260	8.00	501	10.00	980
.10	29	.10	130	.10	268	.10	519	.10	1010
.20	32	.20	136	.20	276	.20	538	.20	1040
.30	35	.30	142	.30	285	.30	558	.30	1070
.40	39	.40	148	.40	294	.40	579	.40	1100

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF CUSSEWAGO CREEK NEAR MEADVILLE, CRAWFORD COUNTY, PA.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	2.90	63	8.80	463	.....	40	7.20	330	3.10	73	1.55	15	0.78	5	0.43	1	1.48	14
2,	2.70	53	8.10	519	.....	40	6.40	294	2.80	58	1.30	10	0.78	5	0.38	1	2.13	30
3,	2.50	43	6.60	314	.....	40	7.90	483	2.50	43	1.20	9	0.68	4	0.38	1	2.68	52
4,	3.10	73	5.00	186	.....	40	9.00	709	2.25	34	1.25	10	0.63	3	0.38	1	2.23	38
5,	3.00	68	4.70	166	.....	40	8.40	578	3.85	115	1.70	18	0.58	3	0.38	1	‡1.68	18
6,	2.40	39	3.80	112	.....	60	6.25	280	9.15	744	2.40	39	0.78	5	0.38	1	1.13	8
7,	*	160	4.70	166	.....	60	5.30	207	9.50	833	1.90	23	0.68	4	0.38	1	0.98	7
8,	*	160	4.40	148	.....	60	7.50	419	8.70	641	1.60	16	0.68	4	0.38	1	0.88	6
9,	*	160	4.70	166	.....	60	8.35	568	‡6.98	355	1.30	10	0.58	3	0.38	1	0.83	5
10,	*	160	3.95	121	.....	60	8.70	641	5.25	204	1.06	8	0.58	3	0.38	1	0.78	5
11,	*	160	3.35	86	.....	55	8.10	519	4.00	124	1.10	8	0.58	3	0.58	3	0.68	4
12,	*	160	2.90	63	.....	55	7.25	398	8.60	620	1.10	8	0.53	2	0.63	3	0.68	4
13,	*	160	2.65	50	.....	55	7.70	450	10.80	1220	0.90	6	0.58	3	0.73	4	0.63	3
14,	*	160	2.60	48	.....	55	6.35	290	9.65	876	0.85	6	0.93	7	0.68	4	0.58	3
15,	*	160	†	36	.....	55	3.95	121	8.85	674	0.70	4	1.23	9	0.58	3	0.58	3
16,	†	80	.....	36	.....	350	5.00	186	7.20	330	0.80	5	1.08	8	0.48	2	0.58	3
17,	.....	80	.....	36	.....	350	6.50	304	3.70	106	0.75	4	0.88	6	0.53	2	0.53	2
18,	.....	80	.....	36	.....	350	5.40	214	3.10	73	0.70	4	0.83	5	0.48	2	0.48	2
19,	.....	80	.....	36	.....	350	4.10	130	2.70	53	0.70	4	0.78	5	0.43	1	0.48	2
20,	.....	80	.....	36	7.75	458	3.40	88	2.35	37	0.70	4	0.68	4	0.48	2	0.48	2
21,	.....	80	.....	36	‡5.82	246	3.20	78	2.25	34	0.80	5	0.68	4	0.48	2	0.48	2
22,	.....	80	.....	35	3.90	118	3.05	70	2.10	29	1.20	9	0.63	3	0.43	2	0.48	2
23,	.....	80	.....	35	3.60	100	2.90	63	2.00	26	2.00	26	0.58	3	0.53	2	0.43	2
24,	.....	80	.....	30	3.55	97	2.70	53	1.90	23	1.45	13	0.53	2	0.78	5	0.48	2
25,	.....	80	.....	30	4.00	124	3.20	78	1.70	18	1.05	8	0.53	2	0.68	4	0.48	2
26,	.....	80	.....	30	6.40	294	6.10	268	1.70	18	0.95	6	0.58	3	0.68	4	0.53	2
27,	.....	80	.....	30	7.40	405	7.40	405	1.50	14	0.85	6	0.53	2	0.63	3	0.58	3
28,	.....	150	.....	30	10.10	1010	7.60	434	1.55	15	0.80	5	0.53	2	0.58	3	0.58	3
29,	.....	200	.....	.....	9.60	861	4.50	154	1.70	18	0.80	5	0.48	2	0.63	3	0.58	3
30,	.....	400	.....	.....	8.90	686	3.35	86	1.40	12	0.70	4	0.48	2	0.68	4	0.58	3
31,	9.45	829	.....	.....	8.10	519	.....	.....	1.55	15	.....	.....	0.48	1	1.08	7	.....	.....

*Chain broken. †Creek frozen Jan. 16-30 inclusive; Feb. 15-March 19 inclusive, and discharge estimated from climatological records. ‡Interpolated.

ESTIMATED MONTHLY DISCHARGE OF CUSSEWAGO CREEK NEAR MEADVILLE, CRAWFORD COUNTY, PA.

(Drainage area 90 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum	Minimum	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	820	39	139	1.544	1.780
February,	663	.....	117	1.300	1.364
March,	1010	.....	229	2.544	2.933
April,	709	52	298	3.311	3.694
May,	1220	12	241	2.678	3.088
June,	39	4	10	0.111	0.124
July,	9	1	4	0.044	0.051
August,	7	1	2	0.022	0.025
September,	52	2	8	0.089	0.099

Creek frozen January 16-30 inclusive; February 15-March 19 inclusive, and discharge estimated from climatological records.

FRENCH CREEK.

DESCRIPTION OF BASIN.

French Creek, in northwestern Pennsylvania, is one of the largest feeders of the Allegheny River, draining approximately 1,249 square miles, of which about 114 lie in New York State. It rises in the plateau in the southwestern corner of New York State, and flows approximately 25 miles southwesterly to the Pennsylvania line, crossing it into Erie County, Pa., 17 miles south of Lake Erie. From this point the stream continues in a general southwesterly direction through Erie and Crawford counties, cutting across the northeast corner of Mercer County into Venango, it follows a southeasterly course to its mouth at Franklin, the total length being about 100 miles. This stream throughout its entire length flows through a well inhabited, agricultural country, almost deforested, and containing in its basin many important and thriving communities. In general this stream flows through a broad valley, bounded by rolling hills and is tortuous in its course, flowing slowly with a gentle slope, often through long deep pools. From where it enters Venango County, however, to its mouth, a distance of 12½ miles, the fall is steeper, often broken by rapids, the hills on either side being higher. The source of French Creek lies at an approximate elevation of 1700 feet, and to LeBouef, 12 miles below the Pennsylvania State

line, it falls at the rate of 14 feet per mile; thence to the Mercer-Venango county line, a distance of 50 miles, the rate is about 3 feet per mile, and from this point to the mouth, approximately 12 miles the rate of fall is 8 feet per mile. All but a small section of this basin near the mouth, lies within the glacial area, and at Cambridge Springs, where the valley of the creek for about eight miles above and below the town is extremely broad and flat, is said to have been formerly the bed of a large glacial lake. There are many mineral springs in this section of the drainage basin. Throughout the entire drainage area of French Creek are numerous lakes, ponds and swamps from which the tributaries of the stream emanate. Conneaut Lake, said to be the largest in Pennsylvania, lies in this watershed. The principal tributaries are—South Branch, Le Boeuf, Conewago Creek, Conneautee Creek, Muddy Creek, Conneaut Creek, Woodcock Creek and Big Sugar Creek. Numerous domestic and industrial water supplies are obtained from French Creek and its tributaries. This creek at one time was extensively used by grist and flour mills for power purposes, all but a few of these plants have been abandoned. At one period a state canal followed the lower portion of this stream.

The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge has been measured since April 29, 1908, at Carlton, about 13 miles above the mouth.

OHIO BASIN—STATION NO. 9.

FRENCH CREEK AT CARLTON, PA.

DESCRIPTION OF STATION.

LOCATION—On two span, steel, through-truss, highway bridge near Erie Railroad Station, Carlton, Mercer County.

RECORDS AVAILABLE—Discharge complete from April 29, 1908, to August 7, 1914, and gage heights from August 8 to September 30, 1914.

DRAINAGE AREA—1,070 square miles.

GAGE—A standard chain gage is attached to the downstream handrail, left span. The length of chain from the bottom of the

weight to the marker is 22.82 feet. The elevation of zero is 1033.67 feet. Bench Mark No. 1 is right hand downstream corner of center pier coping, elevation 1051.25 feet above sea level. Bench Mark No. 2 is aluminum tablet in top stone at northeast corner of bridge, stamped "1052-1908," elevation 1052.034 feet above sea level. Bench Mark No. 3 is on the downstream left abutment on the fourth course below bridge seat near face of abutment on wingwall, elevation 1047.0 feet above sea level. The gage is read twice daily by E. E. Dean.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge, and by wading during extreme low stages. The initial point for soundings is end of upper angle of downstream handrail at right bank.

CHANNEL—The channel above and below the station curves gradually to the left. There is an old dam 800 feet upstream, and an old dam 1½ miles downstream. The right bank is high and not subject to overflow. The left bank is low and water passes around several feet deep for width of 400 feet during high floods. The left approach is 8 feet, more or less, below floor of bridge. The bed is composed of sand, gravel and boulders.

REMARKS—Prior to August 8, 1914, a staff gage fastened to the downstream side of the pier in the right span was read twice daily. On August 7, 1914, a chain gage was placed on the same datum over the left channel where the water surface is at a different elevation than at the old staff gage, which will require a re-rating of the lower part of the curve.

DISCHARGE MEASUREMENTS OF FRENCH CREEK AT CARLTON, MERCER COUNTY, PA.

(Drainage area 1,070 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
29	1914 Aug. 7	Wilson & Taylor, ...	211	144	0.74	0.36	106	0.6 msmt. New gage.

DISCHARGE TABLE FOR FRENCH CREEK AT CARLTON, MERCER COUNTY, FROM APRIL 29, 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
—.10	75	.40	1300	.90	4350	.40	8720	.90	14900
0.00	90	.50	1390	5.00	4500	.50	8920	10.00	15300
.10	105	.60	1480	.10	4650	.60	9120	.10	15670
.20	125	.70	1570	.20	4800	.70	9320	.20	16070
.30	145	.80	1670	.30	4960	.80	9520	.30	16470
.40	170	.90	1775	.40	5120	.90	9720	.40	16880
.50	195	3.00	1880	.50	5280	8.00	9920	.50	17300
.60	220	.10	1985	.60	5450	.10	10120	.60	17730
.70	250	.20	2095	.70	5620	.20	10330	.70	18180
.80	280	.30	2210	.80	5790	.30	10550	.80	18630
.90	320	.40	2325	.90	5960	.40	10780	.90	19100
1.00	365	.50	2445	6.00	6130	.50	11010	11.00	19600
.10	410	.60	2565	.10	6300	.60	11250	.10	20100
.20	460	.70	2685	.20	6480	.70	11500	.20	20600
.30	520	.80	2810	.30	6660	.80	11750	.30	21100
.40	580	.90	2940	.40	6840	.90	12000	.40	21600
.50	640	4.00	3070	.50	7020	9.00	12250	.50	22100
.60	705	.10	3200	.60	7200	.10	12520	.60	22650
.70	770	.20	3340	.70	7380	.20	12800	.70	23200
.80	835	.30	3480	.80	7560	.30	13100	.80	23800
.90	905	.40	3620	.90	7740	.40	13400	.90	24400
2.00	980	.50	3760	7.00	7930	.50	13700	12.00	25000
.10	1055	.60	3900	.10	8120	.60	14000		
.20	1135	.70	4050	.20	8320	.70	14300		
.30	1215	.80	4200	.30	8520	.80	14620		

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF FRENCH CREEK AT CARLTON, VENANGO COUNTY, PA.

1914. DAY.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.
	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H
1.	1.74	796	9.50	13700	.....	450	6.40	6840	2.95	1830	1.20	460	.52	200	.08	102	.88
2.	1.62	718	7.40	8720	.....	450	6.30	6660	2.62	1500	1.05	388	.47	188	.04	96	1.08
3.	1.57	680	5.75	5700	.....	450	6.90	7740	2.32	1230	.98	356	.44	180	.02	93	1.03
4.	1.48	628	5.06	4590	.....	450	7.15	8220	2.20	1140	1.02	374	.42	175	.02	93	.98
5.	1.72	783	4.70	4050	.....	450	6.25	6570	3.45	2380	1.50	640	.40	170	.02	93	.78
6.	2.45	1340	3.76	2760	.....	450	5.11	4660	6.75	7470	1.44	604	.36	160	.02	93	.66
7.	2.75	1620	3.50	2440	.....	450	4.95	4420	6.85	7650	1.34	544	.34	155	.02	93	.60
8.	2.58	1460	3.00	1880	.....	450	7.18	8280	5.60	5450	1.16	440	.30	145	†.40	.....	.62
9.	2.75	1620	2.55	1440	.....	450	7.45	8820	4.75	4120	1.03	378	.30	145	.38	.....	.59
10.	3.05	1930	2.42	1320	.....	450	7.12	8160	4.10	3200	.88	312	.30	145	.37	.....	.53
11.	3.30	2210	2.60	1480	.....	450	5.92	5940	3.70	2680	.80	280	.30	145	.44	.....	.53
12.	3.22	2120	2.55	1440	.....	450	6.50	7020	7.45	8820	.73	259	.30	145	.58	.....	.50
13.	2.80	1670	2.44	1340	.....	450	6.20	6480	9.02	12300	.72	256	.30	145	.51	.....	.48
14.	2.62	1500	2.20	1140	1.85	870	5.20	4800	9.50	13700	.70	250	.55	208	.44	.....	.42
15.	2.75	1620	1.92	920	2.74	1610	4.26	3420	8.55	11100	.65	235	.68	244	.44	.....	.47
16.	2.85	1720	1.84	863	5.00	4500	4.85	4280	5.70	5620	.52	200	.74	262	.42	.....	.45
17.	2.78	1650	1.84	863	6.90	7740	5.10	4650	4.40	3620	.48	190	.71	253	.40	.....	.44
18.	2.95	1830	1.72	783	8.30	10600	4.50	3760	3.60	2560	.48	190	.60	220	.40	.....	.42
19.	2.80	1670	1.76	809	7.85	9620	3.82	2840	3.10	1980	.59	218	.51	198	.40	.....	.41
20.	2.75	1620	1.60	705	6.05	6220	3.45	2380	2.75	1620	.50	195	.47	188	.42	.....	.42
21.	3.05	1930	1.85	870	4.95	4420	3.16	2060	2.50	1390	.48	190	.32	150	.40	.....	.42
22.	3.42	2350	1.64	731	4.00	3070	2.98	1860	2.25	1180	.85	300	.20	125	.40	.....	.46
23.	3.60	2560	1.44	604	3.55	2500	2.78	1650	2.04	1010	.78	274	.18	121	.44	.....	.44
24.	3.90	2940	*	600	3.22	2120	2.62	1500	1.82	849	.72	256	.18	121	.70	.....	.41
25.	4.65	3980	.....	600	3.35	2270	2.80	1670	1.66	744	.62	226	.18	121	.71	.....	.42
26.	4.70	4050	.....	600	5.45	5200	5.40	5120	1.46	616	.55	208	.18	121	.66	.....	.40
27.	4.60	3900	.....	600	6.55	7110	5.40	5120	1.36	566	.50	195	.18	121	.76	.....	.42
28.	5.75	5700	.....	600	9.25	13000	4.58	3870	1.32	532	.50	195	.16	117	.66	.....	.40
29.	7.50	8920	.....	.....	10.45	17100	3.82	2840	1.30	520	.52	200	.14	113	.62	.....	.42
30.	9.70	14300	.....	.....	10.60	17700	3.35	2270	1.32	532	.52	200	.12	109	.60	.....	.41
31.	10.10	15700	.....	.....	8.60	11200	.....	.....	1.22	472	.....	.....	.10	105	.54	.....	.....

*Creek frozen Feb. 24 to Mar. 13 inclusive, discharge estimated from climatological records. †On Aug. 7 a chain gage was placed on the same datum over the left channel where the water surface is at a different elevation than at the old staff gage, which will require a re-rating of the lower part of the curve.

ESTIMATED MONTHLY DISCHARGE OF FRENCH CREEK AT CARLTON, VENANGO COUNTY, PA.

(Drainage area 1,070 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	15700	628	3080	2.879	3.319
February,	13700	600	2220	2.075	2.162
March,	17700	450	4280	4.000	4.612
April,	8820	1500	4300	4.486	5.006
May,	13700	472	3500	3.271	3.771
June,	640	190	300	0.280	0.312
July,	262	105	161	0.150	0.173

Creek frozen Feb. 24 to Mar. 13 inclusive, discharge estimated from climatological records.
On Aug. 7 a chain gage was placed on the same datum over the left channel where the water surface is at a different elevation than at the old staff gage, which will require a re-rating of the lower part nt the curve.

SUGAR CREEK.

DESCRIPTION OF BASIN.

Sugar Creek, one of the largest tributaries of French Creek, rises in two branches in the southeast corner of Crawford County and flows in a general southerly direction with numerous large tributaries from the east and west, draining approximately 173 square miles, to its mouth at Sugar Creek Station, Venango County, a distance of approximately twenty miles. It flows through a well populated, agricultural region, the side hills being low and rolling and the valleys wide and flat. There are numerous small villages in the watershed, the largest of which is Cooperstown Borough. The production of oil is extensive through the valley.

The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge of this stream has been measured since May 6, 1910, at Wyattville, about three miles above the mouth.

OHIO BASIN—STATION NO. 10.

SUGAR CREEK AT WYATTVILLE, PA.

DESCRIPTION OF STATION.

LOCATION—On steel, highway bridge at Wyattville, 3 miles above the mouth of the creek.

RECORDS AVAILABLE—Discharge complete from May 7, 1910, to September 30, 1914.

DRAINAGE AREA—160 square miles.

GAGE—A chain gage is attached to the bridge. The length of chain from the bottom of the weight to the marker is 13.77 feet. The elevation of zero is 1050.96 feet. Bench Mark No. 1 is on top of left abutment, downstream side of bridge, elevation 1062.48 feet above sea level. Bench Mark No. 2 is chiseled rod seat on projection of fifth course down from top on upstream end of left abutment, elevation 6.49 feet above gage datum, or 1057.45 feet above sea level. The gage is read once daily by T. G. Wyatt.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge, or by wading at a section ¼ mile below the bridge at low stages. The initial point for soundings is face of left abutment.

CHANNEL—The channel above and below the station is straight for 600 feet and 1,500 feet respectively. The right bank is high and does not overflow. The left bank overflows only at extremely high stages. The bed is composed of gravel.

REMARKS—At low water a pool is formed owing to the flat slope of the creek.

DISCHARGE MEASUREMENTS OF SUGAR CREEK AT WYATTVILLE, VENANGO COUNTY, PA.

(Drainage area 160 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914.		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
10	Aug. 7,	Wilson & Taylor,....	29	15	1.60	1.52	24	Wading msmt. 500 feet below bridge.

DISCHARGE TABLE FOR SUGAR CREEK AT WYATTVILLE, VENANGO COUNTY, FROM MAY 7, 1910.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1.00	10	.10	115	.10	619	.10	1315	.10	2180
.10	11	.20	142	.20	683	.20	1395	.20	2270
.20	13	.30	177	.30	748	.30	1475	.30	2360
.30	16	.40	220	.40	813	.40	1555	.40	2450
.40	21	.50	268	.50	880	.50	1640	.50	2540
.50	28	.60	320	.60	950	.60	1730	.60	2630
.60	37	.70	375	.70	1020	.70	1820	.70	2720
.70	47	.80	432	.80	1090	.80	1910	.80	2810
.80	59	.90	491	.90	1165	.90	2000	.90	2900
.90	75	3.00	555	4.00	1240	5.00	2090	6.00	2990
2.00	94								

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF SUGAR CREEK AT WYATTVILLE, VENANGO COUNTY, PA.

1914. DAY.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	*1.99	92	3.69	1010	.....	55	2.90	491	2.71	381	1.92	79	1.72	49	1.62	39	1.70	47
2,	*1.99	92	3.19	677	.....	55	2.90	491	2.51	273	1.92	79	1.62	39	1.62	39	1.70	47
3,	1.99	92	3.19	677	.....	55	2.80	432	2.41	225	1.92	79	1.62	39	1.62	39	1.70	47
4,	1.99	92	3.09	613	.....	55	2.70	375	2.21	146	1.92	79	1.62	39	1.62	39	1.70	47
5,	1.99	92	2.99	549	.....	55	2.60	320	3.36	787	1.92	79	1.62	39	1.62	39	1.70	47
6,	1.99	92	2.89	485	.....	55	2.60	320	4.41	1560	1.82	62	1.62	39	1.52	30	1.70	47
7,	1.99	92	2.89	485	.....	55	2.90	491	3.91	1170	1.82	62	1.62	39	1.52	30	1.70	47
8,	1.99	92	2.79	426	.....	55	4.50	1640	3.61	957	1.82	62	1.62	39	1.60	37	1.70	47
9,	1.99	92	*	140	1.79	58	4.40	1560	3.31	754	1.82	62	1.62	39	1.70	47	1.70	47
10,	2.09	113	.....	140	1.79	58	4.30	1480	2.91	497	1.82	62	1.62	39	1.70	47	1.70	47
11,	2.09	113	.....	140	1.79	58	3.90	1160	2.61	326	1.72	49	1.62	39	1.80	59	1.70	47
12,	2.09	113	.....	140	1.99	92	3.60	950	5.71	2730	1.72	49	1.62	39	1.80	59	1.70	47
13,	*2.09	113	.....	140	2.29	174	2.90	491	5.51	2550	1.72	49	1.72	49	1.80	59	1.70	47
14,	*2.09	113	.....	140	2.29	174	2.70	375	4.91	2010	1.72	49	1.72	49	1.80	59	1.70	47
15,	2.09	113	.....	140	2.49	263	2.60	320	4.61	1740	1.72	49	1.72	49	1.70	47	1.60	37
16,	2.09	113	.....	140	3.74	1050	2.60	320	3.31	754	1.72	49	1.62	39	1.70	47	1.60	37
17,	2.09	113	.....	110	3.49	873	2.60	320	2.81	433	1.72	49	1.62	39	1.70	47	1.60	37
18,	2.09	113	.....	110	3.49	873	2.70	375	2.61	326	1.72	49	1.62	39	1.70	47	1.60	37
19,	2.09	113	.....	110	3.29	742	2.70	375	2.41	225	1.82	62	1.62	39	1.70	47	1.60	37
20,	2.09	113	.....	110	2.89	485	2.80	432	2.31	181	1.92	79	1.52	30	1.70	47	1.60	37
21,	2.39	216	.....	110	2.69	370	2.70	375	2.31	181	1.92	79	1.52	30	1.80	59	1.60	37
22,	2.39	216	.....	110	2.39	216	2.70	375	2.21	146	2.22	149	1.52	30	1.80	59	1.60	37
23,	2.49	263	.....	110	2.29	174	2.70	375	2.11	118	2.02	98	1.62	39	1.80	59	1.60	37
24,	2.49	263	.....	110	2.39	216	2.70	375	2.11	118	1.92	79	1.62	39	1.80	59	1.60	37
25,	2.59	315	.....	110	2.39	216	3.00	555	2.01	96	2.02	98	1.62	39	1.80	59	1.70	47
26,	2.59	315	.....	110	3.74	1050	4.30	1480	2.01	96	1.92	79	1.62	39	1.80	59	1.70	47
27,	2.79	426	.....	110	4.09	1210	3.40	813	2.01	96	1.82	62	1.62	39	1.80	59	1.70	47
28,	3.34	774	.....	110	5.59	2620	3.20	683	2.01	96	1.72	49	1.62	39	1.70	47	1.70	47
29,	†4.94	2040	.....	.....	4.89	1990	2.90	491	2.01	96	1.72	49	1.62	39	1.70	47	1.70	47
30,	4.44	1590	.....	.....	3.29	806	2.90	491	1.91	77	1.72	49	1.62	39	1.70	47	1.70	47
31,	4.19	1390	.....	.....	3.19	677	.....	.....	1.91	77	.....	.....	1.62	39	1.70	47	.....	.....

*Creek frozen Jan. 1, 2, 13, 14, Feb. 9 to Mar. 8 inclusive, and discharge estimated Feb. 9 to Mar. 8 inclusive from Oil Creek at Rouseville. †Max. 5.59 at 6 p. m.=2620 sec. ft.

ESTIMATED MONTHLY DISCHARGE OF SUGAR CREEK AT WYATTVILLE, VENANGO COUNTY, PA.

(Drainage area 160 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	2040	.....	319	1.994	2.299
February,	1010	.....	263	1.644	1.712
March,	2820	.....	483	3.019	3.481
April,	1640	320	624	3.900	4.351
May,	2730	77	620	3.875	4.468
June,	149	49	68	0.425	0.474
July,	49	30	39	0.244	0.281
August,	58	30	49	0.306	0.353
September,	47	37	44	0.275	0.306

Creek frozen January 1, 2, 13, 14; Feb. 9 to March 8 inclusive, and discharge estimated Feb. 9 to March 8 inclusive from Oil Creek at Rouseville.

SANDY CREEK.

DESCRIPTION OF BASIN.

Sandy Creek, with a total drainage area of 159 square miles and a length of 36 miles, rises in the southern part of Crawford County and follows a southeasterly direction to Sandy Lake Borough and then an easterly course to its mouth in the Allegheny River. The elevation of the source is 1,350 feet and of the mouth 930 feet; the first 6½ miles from the source has a slope of 23 feet per mile, the next 16 miles to Reeds Furnace, a slope of 2.5 feet per mile and thence to the mouth, a distance of 13½ miles, the slope is 17 feet per mile.

Sandy Creek drains a country with rolling hills and broad valleys. The basin above Reeds Furnace lies within the glaciated area and contains marshes and small lakes, including Sandy Lake. The stream has a number of small tributaries, the largest of which is South Sandy Creek with a length of 10 miles and a drainage area of 27 square miles.

Polk and Sandy Lake are the largest towns in the basin and, in addition to farming and coal mining, there are oil and gas wells. The stream is used for water power by a few small grist mills.

The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge has been measured since May 11, 1914, at Sandy Lake Borough.

OHIO BASIN—STATION NO. 11.

SANDY CREEK AT SANDY LAKE, PA.

DESCRIPTION OF STATION.

LOCATION—At single span, iron, through-truss, highway bridge, at Lake Street, Sandy Lake, Mercer County.

RECORDS AVAILABLE—Discharge measurements and gage heights from May 11, to September 30, 1914.

DRAINAGE AREA—54 square miles.

GAGE—A standard chain gage is fastened to the guardrail on the downstream side of the bridge. The length of chain from the bottom of the weight to the marker is 14.31 feet. The elevation of zero is 1150.875 feet above sea level. Bench Mark No. 1 is small point on stone on extreme corner of coping stone, downstream end of east abutment, or southeast corner of left abutment looking downstream, and is marked with white paint, elevation 1159.520 feet above sea level. The gage is read twice daily by T. S. Bailey.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge, and by wading at a section 250 feet below bridge. The initial point for soundings is face of flat stone, second course from top, near downstream corner of west abutment or right looking downstream.

CHANNEL—The channel is straight for a short distance above and below the station. There are two islands above the bridge, and one below, the latter becoming submerged at approximately gage height 2.5 feet. Both banks are low, with small willows bordering the creek channel. The bed is composed of gravel and stones, with occasional sand bars.

DISCHARGE MEASUREMENTS OF SANDY CREEK AT SANDY LAKE, MERCER COUNTY, PA.

(Drainage area 54 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914.		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
1	May 8,	Knight,	84	91	2.04	1.71	185	0.2 and 0.8 method.
2	May 12,	Knight,	88	177	2.18	2.71	386	0.2 and 0.8 method.
3	May 12,	Knight,	99	227	2.41	3.26	548	0.2 and 0.8 method.
4	May 13,	Knight,	99	326	3.10	4.32	1009	Surf. msmt.
5	May 13,	Knight,	99	312	2.95	4.08	919	Surf. msmt.
6	May 14,	Knight,	99	250	2.66	3.42	664	0.2 and 0.8 method.
7	May 20,	Knight,	44	26	1.20	1.10	31	Wading msmt.
8	Aug. 10,	Wilson & Taylor,	23	10	1.79	0.76	19	Wading msmt.

DAILY MEAN GAGE HEIGHTS OF SANDY CREEK AT SANDY LAKE, MERCER COUNTY, PA.

1914.	MAY.	JUNE.	JULY.	AUG.	SEPT.
DAY.	G H	G H	G H	G H	G H
1,	.....	0.79	0.45	0.53	0.65
2,	.....	0.77	0.45	0.24	0.76
3,	.....	0.80	0.46	0.25	0.59
4,	.....	0.88	0.54	0.24	0.58
5,	.....	1.02	0.47	0.45	0.55
6,	.....	0.94	0.41	0.39	0.43
7,	.....	0.89	0.43	0.34	0.47
8,	.....	0.84	0.40	0.49	0.40
9,	.....	0.92	0.44	0.44	0.37
10,	.....	0.81	0.56	0.51	0.34
11,	1.37	0.88	0.45	0.57	0.31
12,	2.98	0.70	0.51	0.91	0.41
13,	4.20	0.66	0.62	0.33	0.34
14,	3.28	0.42	0.75	0.27	0.70
15,	2.22	0.57	0.76	0.44	0.37
16,	1.75	0.62	0.69	0.31	0.48
17,	1.38	0.32	0.76	0.43	0.51
18,	1.21	0.53	0.77	0.62	0.56
19,	1.09	0.74	0.67	0.44	0.45
20,	1.09	0.76	0.64	0.47	0.31
21,	1.08	0.52	0.65	0.48	0.31
22,	1.07	0.81	0.40	0.45	0.47
23,	1.06	1.08	0.55	0.53	0.46
24,	1.01	1.04	0.51	0.80	0.45
25,	0.97	0.91	0.55	0.83	0.47
26,	0.91	0.58	0.44	0.86	0.42
27,	0.87	0.79	0.70	0.60	0.45
28,	0.84	0.45	0.37	0.58	0.47
29,	0.92	0.81	0.25	0.53	0.63
30,	0.84	0.47	0.36	0.64	0.65
31,	0.74	.....	0.43	0.68	.....

CLARION RIVER.

DESCRIPTION OF BASIN.

The Clarion River, one of the largest tributaries of the Allegheny River, draining an area of approximately 1,232 square miles, rises in several branches in the southern part of McKean County. The upper branches flow in a general southerly direction to Johnsonburg, Elk County, where they unite to form the Clarion River proper. From this point the river flows in a general southwesterly direction, in a very tortuous course, to its mouth, at Foxburg, a distance of approximately 95 miles. The elevation of the main stream at Johnsonburg is 1442 feet, while at its mouth it is 846 feet, giving an average slope of six and one-half feet per mile. From Johnsonburg the river flows through a fairly broad valley until it passes Ridgway, Elk County, where it enters a deep and narrow valley, with high sides, which gradually increase in height as the gorge narrows, so that when the river reaches Clarion County it flows in a narrow bed, with very high precipitous sides, often reaching an altitude of 400 feet above the stream. The hillsides below Ridgway have been practically deforested of their virgin timber and are now covered with a heavy second growth.

The upper portion of the main valley is more thickly inhabited and more largely devoted to agriculture than is the lower section, in which portion the main valley is very sparsely inhabited and largely forest covered, while the plateau land, on either side, is quite generally under cultivation. In the upper portions of the watersheds of the tributaries much of the timber has been destroyed by forest fires and removed by pulp and paper companies, but there are numerous small bituminous coal operations, while in the lower part of the main valley gas wells, in considerable quantities are operated. In Elk County the tributaries are used quite considerably for domestic and industrial water supply, while in Clarion County, with the exception of the borough of Clarion, the stream is little used. In Elk County the stream is badly polluted by tanneries, paper mills and chemical works. The main tributaries are the West Branch, Elk, Little Toby, in Elk County, and Licking, Deer, Piney, Toby and Big Mills creeks, in Clarion County.

The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge has been measured since March, 1908, at Clarion, about thirty miles above the mouth.

OHIO BASIN—STATION NO. 12.

CLARION RIVER AT CLARION, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, steel, through-truss, highway bridge, about one mile from Clarion, Clarion County.

RECORDS AVAILABLE—Discharge complete from November 22, 1909, to September 30, 1914. Prior to this date, gage heights were obtained since November 17, 1884, by the U. S. Weather Bureau.

DRAINAGE AREA—910 square miles.

GAGE—A Mott gage is attached to the downstream side of the bridge. The length of tape is 33.85 feet. The elevation of zero is 1052.0 feet. Bench Mark No. 1 is top line of right abutment, elevation 1080.48 feet. The gage is read once daily by J. A. Miller.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is right end top angle of downstream handrail.

CHANNEL—The channel above and below the station is straight for 800 feet and 1,200 feet respectively. The banks are high and not subject to overflow. The bed is composed of rock, gravel and boulders.

DISCHARGE MEASUREMENTS OF CLARION RIVER AT CLARION, CLARION COUNTY, PA.

(Drainage area 910 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914.		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
22	April 4,	Crick, ...	186	1229	4.41	4.60	5432	0.2 and 0.8 method.
23	April 5,	Crick, ...	178	1156	3.64	4.22	4206	0.2 and 0.8 method.
24	April 10,	Hosmer, ...	175	1031	4.41	4.23	4546	Surf. msmt.
25	Aug. 10,	Wilson & Taylor, ...	131	423	0.26	—0.62	111	0.6 msmt.

DISCHARGE TABLE FOR CLARION RIVER AT CLARION, CLARION COUNTY, FROM JAN. 1, 1912.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.ft.	Feet.	Sec.ft.	Feet.	Sec.ft.	Feet.	Sec.ft.	Feet.	Sec.ft.
—0.70	90	.30	1640	.30	6440	.30	14430	.30	23130
—0.60	100	.40	1740	.40	6660	.40	14720	.40	23420
—0.50	110	.50	1840	.50	6880	.50	15010	.50	23710
—0.40	120	.60	1950	.60	7100	.60	15300	.60	24000
—0.30	135	.70	2060	.70	7330	.70	15590	.70	24290
—0.20	155	.80	2180	.80	7560	.80	15880	.80	24580
—0.10	180	.90	2300	.90	7790	.90	16170	.90	24870
0.00	215	3.00	2425	6.00	8020	9.00	16460	12.00	25160
.10	250	.10	2550	.10	8260	.10	16750	.10	25450
.20	285	.20	2680	.20	8500	.20	17040	.20	25740
.30	325	.30	2810	.30	8750	.30	17330	.30	26030
.40	370	.40	2950	.40	9000	.40	17620	.40	26320
.50	420	.50	3095	.50	9260	.50	17910	.50	26610
.60	470	.60	3240	.60	9530	.60	18200	.60	26900
.70	520	.70	3390	.70	9800	.70	18490	.70	27190
.80	570	.80	3550	.80	10080	.80	18780	.80	27480
.90	620	.90	3710	.90	10370	.90	19070	.90	27770
1.00	675	4.00	3880	7.00	10660	10.00	19360	13.00	28060
.10	735	.10	4050	.10	10950	.10	19650	.10	28350
.20	795	.20	4220	.20	11240	.20	19940	.20	28640
.30	860	.30	4400	.30	11530	.30	20230	.30	28930
.40	925	.40	4600	.40	11820	.40	20520	.40	29220
.50	995	.50	4800	.50	12110	.50	20810	.50	29510
.60	1065	.60	5000	.60	12400	.60	21100	.60	29800
.70	1135	.70	5200	.70	12690	.70	21390	.70	30090
.80	1210	.80	5400	.80	12980	.80	21680	.80	30380
.90	1290	.90	5600	.90	13270	.90	21970	.90	30670
2.00	1370	5.00	5800	8.00	13560	11.00	22260	14.00	30960
.10	1460	.10	6010	.10	13850	.10	22550		
.20	1550	.20	6220	.20	14140	.20	22840		

Note.—This table is only applicable subsequent to January 1, 1912, and is based on former curve and 3 high water measurements made during 1913.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF CLARION RIVER AT CLARION, CLARION COUNTY, PA.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	*	800	5.15	6120	.....	600	5.80	7790	3.70	3390	1.80	1210	0.80	570	—0.10	180	0.60	470
2,	.....	800	5.60	7100	.....	600	5.60	7100	3.10	2550	1.70	1140	0.60	470	—0.30	135	0.50	420
3,	.....	800	5.25	6330	.....	600	5.80	7560	2.70	2060	1.60	1060	0.50	420	—0.30	135	0.70	520
4,	.....	800	5.50	6880	.....	600	5.30	6440	2.50	1840	1.60	1060	0.40	370	—0.30	135	0.90	620
5,	.....	800	5.05	5900	.....	600	4.20	4220	3.00	2420	1.80	1210	0.40	370	—0.30	135	0.80	570
6,	.....	800	4.65	5100	.....	600	3.80	3550	3.80	3550	2.10	1460	0.30	325	—0.40	120	0.60	470
7,	.....	800	4.60	5000	.....	600	3.90	3710	4.10	4050	2.00	1370	0.30	325	—0.50	110	0.50	420
8,	.....	800	4.05	3960	.....	600	5.00	5800	3.60	3240	1.50	995	0.20	285	—0.60	100	0.40	370
9,	.....	800	3.90	3710	.....	600	4.60	5000	3.60	3240	1.30	860	0.20	285	—0.60	100	0.40	370
10,	.....	800	3.35	2880	.....	600	4.20	4220	4.00	3880	1.10	735	0.20	285	—0.70	90	0.30	325
11,	.....	800	2.85	2240	.....	600	4.70	5200	3.60	3240	0.90	620	0.20	285	—0.60	100	0.10	250
12,	.....	800	2.70	2060	.....	600	4.40	4600	4.20	4400	0.80	570	0.20	285	—0.40	120	0.00	215
13,	.....	800	2.35	1690	.....	600	4.10	4050	10.00	19400	0.70	520	0.40	370	—0.10	180	—0.10	180
14,	.....	800	*	800	.....	600	3.70	3390	8.10	13800	0.50	420	0.60	470	—0.10	180	—0.10	180
15,	.....	800	.....	800	.....	600	3.40	2960	5.90	7790	0.50	420	1.00	675	0.10	250	—0.20	155
16,	.....	800	.....	800	.....	600	3.90	3710	4.30	4400	0.50	420	1.50	995	—0.10	180	—0.20	155
17,	.....	800	.....	800	3.85	16000	4.10	4050	3.80	3550	0.50	420	1.90	1290	—0.10	180	—0.30	135
18,	.....	800	.....	800	5.25	6330	4.00	3880	3.50	3100	0.40	370	1.70	1140	—0.20	155	—0.40	120
19,	.....	800	.....	800	5.10	6010	3.80	3550	3.20	2680	0.30	325	1.60	1060	—0.30	135	—0.50	110
20,	.....	800	.....	800	4.85	5500	3.50	3100	2.90	2300	0.20	285	1.40	925	—0.10	180	—0.60	100
21,	.....	800	.....	800	4.85	5500	3.70	3390	2.90	2300	0.20	285	1.30	860	—0.10	180	—0.60	100
22,	.....	800	.....	800	4.60	5000	3.50	3100	2.60	1950	0.90	620	1.20	795	0.20	285	—0.60	100
23,	.....	800	.....	800	4.25	4310	3.20	2680	2.20	1550	1.10	735	1.20	795	0.10	250	—0.60	100
24,	.....	800	.....	800	3.90	3710	2.90	2300	2.00	1370	1.60	1060	1.10	735	0.10	250	—0.60	100
25,	.....	2950	.....	800	3.45	3020	2.50	1840	1.90	1290	1.90	1290	1.00	675	0.20	285	—0.40	120
26,	.....	2950	.....	800	3.65	3320	5.10	6010	1.80	1210	2.40	1740	1.00	675	0.20	285	—0.40	120
27,	.....	2950	.....	800	6.10	8260	6.00	8020	1.80	1210	2.20	1550	0.70	520	0.10	250	—0.50	110
28,	.....	2950	.....	800	9.92	19200	4.80	5460	1.70	1140	2.80	2189	0.70	520	0.10	250	—0.60	100
29,	4.55	4900	.....	.....	10.30	20200	4.20	4220	1.50	995	2.10	1460	0.50	420	0.30	325	—0.60	100
30,	5.60	7100	.....	.....	9.55	18100	3.90	3710	1.90	1290	1.30	860	0.30	325	0.40	370	—0.60	100
31,	5.35	6550	.....	.....	7.15	11100	.....	.....	1.90	1290	.....	.....	0.10	250	0.50	420	.....	.....

*River frozen Jan. 1-28 inclusive, Feb. 14-March 16 inclusive, and discharge estimated from climatological records.

ESTIMATED MONTHLY DISCHARGE OF CLARION RIVER AT CLARION, CLARION COUNTY, PA.

(Drainage area 910 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	7100	.....	1600	1.758	2.027
February,	7100	.....	2530	2.780	2.895
March,	20200	.....	4680	5.143	5.929
April,	8020	1840	4480	4.923	5.492
May,	19400	995	3560	3.913	4.510
June,	2180	235	906	0.998	1.114
July,	1290	250	573	0.630	0.726
August,	420	90	195	0.214	0.247
September,	620	100	240	0.264	0.294

River frozen Jan. 1-28 inclusive, Feb. 14-March 16 inclusive, and discharge estimated from climatological records.

RED BANK CREEK.

DESCRIPTION OF BASIN.

Red Bank Creek, an important feeder of the Allegheny River from Jefferson, Clarion and Armstrong counties, drains an area of approximately 585 square miles and rises in two streams, Sandy Lick and North Branch, the former heading in Clearfield County and the latter in Jefferson County. Red Bank Creek is formed by their junction at Brookville, Jefferson County, and thence flows in a general westerly direction, with many twists and turns, to its mouth at Red Bank, a distance of about 44 miles. The stream flows through a hilly country, sparsely populated, except in the valley where farming and lumbering is carried on. The slope of the creek is rapid, flowing as it does in a narrow gorge between high hills, the channel being full of large rocks. The junction lies at an elevation of 1235 feet and the mouth at 844 feet, giving the stream an average fall of 9 feet per mile. There are a few boroughs and numerous villages along the stream, some of which obtain their domestic water supply from it. Some bituminous coal mining and oil and gas wells are found in this basin.

The mean annual precipitation over this watershed is from 40 to 50 inches.

The discharge of this stream has been measured at St. Charles, since October 19, 1909, approximately 15 miles above the mouth.

OHIO BASIN—STATION NO. 13.

RED BANK CREEK AT ST. CHARLES, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, wooden, through-truss bridge, at St. Charles, Clarion County.

RECORDS AVAILABLE—Discharge complete from October 30, 1909, to September 30, 1914.

DRAINAGE AREA—540 square miles.

GAGE—A chain gage is fastened to the bridge floor on the upstream side, 50 feet from the north abutment. The length of chain from the bottom of the weight to the marker is 23.97 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is rod seat chiseled in east corner stone, upper course of nose of east abutment (left looking upstream) painted white, 7 feet, more or less, below top of bridge seat, elevation 13.32 feet above gage datum. Bench Mark No. 2 is rod seat in southeast corner of top of same abutment (bridge seat), painted white, 7 feet, more or less, above B. M. No. 1, elevation 20.21 feet above gage datum. The gage is read twice daily by W. H. Bish.

DISCHARGE MEASUREMENTS—Taken from the upstream side of the bridge, and by wading at lowest stages. The initial point for soundings is top edge of bridge seat, north abutment.

CHANNEL—The channel is straight both above and below the station. The right bank overflows at extreme high stages. The left bank is high and does not overflow. The bed is composed of large rocks, but is fairly regular.

DISCHARGE MEASUREMENTS OF RED BANK CREEK AT ST. CHARLES, CLARION COUNTY, PA.

(Drainage area 540 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
13	June 25,	Bowen & Taylor, ...	133	450	1.96	2.89	882	0.6 msmt.
14	Aug. 11,	Wilson & Taylor, ...	95	116	1.07	1.28	124	Wading 200' above bridge.

DISCHARGE TABLE FOR RED BANK CREEK AT ST. CHARLES, CLARION COUNTY, FROM JANUARY 1, 1912.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
0.60	5	.10	420	.60	1585	.10	4080	.80	6805
.70	10	.20	470	.70	1710	.20	4215	.70	6990
.80	15	.30	520	.80	1840	.30	4400	.80	7175
.90	25	.40	570	.90	1975	.40	4585	.90	7360
1.00	40	.50	630	4.00	2120	.50	4770	7.00	7545
.10	60	.60	700	.10	2275	.60	4965	.10	7730
.20	80	.70	770	.20	2440	.70	5140	.20	7915
.30	110	.80	840	.30	2610	.80	5325	.30	8100
.40	140	.90	910	.40	2790	.90	5510	.40	8285
.50	175	3.00	990	.50	2950	6.00	5695	.50	8470
.60	210	.10	1070	.60	3125	.10	5880	.60	8655
.70	245	.20	1150	.70	3300	.20	6065	.70	8840
.80	285	.30	1240	.80	3475	.30	6250	.80	9025
.90	330	.40	1350	.90	3660	.40	6435	.90	9210
2.00	375	.50	1465	5.00	3845	.50	6620	8.00	9395

Note.—This table is only applicable subsequent to Jan. 1, 1912, and is based on 3 discharge measurements made during 1911-12-13, together with former curve.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF RED BANK CREEK AT ST. CHARLES, CLARION COUNTY, PA.

1914	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.
1, ...	1.77	278	6.22	e100	2.10	420	5.00	2840	3.08	1010	1.73	257	1.68	238	1.04	43	2.02	384
2, ...	1.72	253	5.87	5450	*	360	4.55	2040	2.87	889	1.71	249	1.58	208	1.01	42	1.92	339
3, ...	1.82	294	5.47	4710	.....	360	4.[illegible]	[illegible]	2.70	770	1.68	220	1.48	168	0.91	26	2.39	565
4, ...	1.82	294	5.12	4070	.....	360	3.95	2050	2.50	630	1.62	220	1.40	140	0.91	26	2.39	565
5, ...	1.85	308	4.82	3610	.....	360	3.50	1460	2.90	840	1.88	298	1.35	125	0.98	37	2.09	416
6, ...	1.87	316	4.37	2730	.....	360	3.15	1110	4.25	2520	1.73	257	1.30	110	0.94	31	1.79	281
7, ...	1.95	352	4.02	2150	.....	360	3.20	1150	3.75	1780	1.65	228	1.30	110	0.96	34	1.62	217
8, ...	1.90	370	3.72	1740	.....	360	3.90	1960	3.40	1350	1.63	220	1.23	86	0.98	37	1.49	173
9, ...	2.09	416	3 42	1370	.....	360	4.65	3210	3.40	1350	1.58	208	1.15	70	1.04	43	1.32	116
10, ...	2.25	495	3.12	1090	.....	360	4.15	2360	3.30	1240	1.53	186	1.10	60	1.24	92	1.24	93
11, ...	2.39	565	2.82	854	.....	360	3.85	1910	3.00	990	1.53	186	1.10	60	1.12	64	1.16	72
12, ...	2.45	600	2.65	735	.....	360	3.55	1520	4.30	2610	1.48	168	1.05	50	1.36	128	1.19	78
13, ...	2.49	624	2.47	612	.....	360	3.20	1150	†7.72	8330	1.43	150	1.15	70	1.58	203	1.22	86
14, ...	2.55	665	2.39	565	.....	360	2.95	950	5.67	5080	1.38	134	1.40	140	1.48	168	1.24	93
15, ...	2.47	612	2.48	624	3.90	1980	2.75	805	5.15	4120	1.33	119	1.75	265	1.34	122	1.19	78
16, ...	2.42	582	2.47	612	4.10	2230	4.15	2360	4.45	2360	1.28	104	1.98	366	1.26	98	1.12	64
17, ...	2.45	600	2.45	600	7.05	7640	4.32	2640	3.95	2050	1.23	89	1.83	298	1.18	76	1.04	43
18, ...	2.37	555	2.37	555	5.90	5510	4.15	2360	3.45	1410	1.23	89	1.66	231	1.08	56	0.99	38
19, ...	2.37	555	2.37	555	5.25	4810	3.80	1840	3.00	990	1.23	89	1.58	208	0.98	37	0.94	31
20, ...	2.29	515	2.32	530	4.85	3570	3.45	1410	2.70	770	1.15	70	1.48	168	0.88	23	0.86	21
21, ...	2.39	565	2.22	495	3.68	1620	3.28	1220	2.50	630	1.13	66	1.43	150	0.94	31	0.84	19
22, ...	2.53	651	2.17	455	3.40	1350	3.05	1030	2.30	520	1.63	220	1.36	128	0.88	23	0.92	28
23, ...	2.85	975	2.07	406	3.23	1180	2.90	910	2.10	420	2.06	398	1.26	98	0.94	31	0.86	21
24, ...	3.20	1150	2.07	406	3.00	990	3.15	1110	1.93	344	2.15	445	1.18	76	1.51	178	0.96	24
25, ...	3.50	1460	2.02	384	2.80	840	3.90	1980	1 85	308	2.84	868	1.08	56	1.44	154	0.89	24
26, ...	3.40	1350	1.97	362	4.20	2440	4.85	3570	1.75	265	2.87	889	1.03	46	1.24	92	0.86	21
27, ...	3.50	1460	1.97	362	5.50	4770	5.60	4960	1.75	265	2.67	749	0.98	37	1.38	134	0.94	31
28, ...	4.65	3040	2.12	430	7.50	8470	5.10	4080	1.80	286	2.52	644	0.96	34	1.71	249	0.86	21
29, ...	5.80	5320	.....	.....	7.40	8230	4.45	2860	1.83	298	2.27	506	0.90	25	1.88	321	0.94	31
30, ...	6.80	7180	.....	.....	7.30	8100	3.50	1460	1.75	265	1.97	362	0.88	23	1.98	366	0.86	21
31.	6.36	6250	.....	.....	5.65	5050	.....	.....	1.75	265	.....	.....	0.96	34	2.08	411	.....	.....

*Creek frozen Mar. 2 to 14 inclusive, and discharge estimated from Clarion River at Clarion. †Max. 8.15 at 6 a. m.=†9670 sec. ft. ‡Estimated.

ESTIMATED MONTHLY DISCHARGE OF RED BANK CREEK AT ST. CHARLES, CLARION COUNTY, PA.

(Drainage area 540 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	7180	253	1240	2.296	2.647
February,	6100	362	1520	2.815	2.932
March,	8470	.....	2370	4.389	5.060
April,	4960	865	2090	3.870	4.318
May,	‡9670	265	1480	2.741	3.160
June,	889	66	289	0.535	0.596
July,	366	28	125	0.231	0.266
August,	411	23	109	0.202	0.233
September,	565	19	134	0.248	0.277

Creek frozen Mar. 2 to 14 inclusive, and discharge estimated from Clarion River at Clarion.
‡Estimated.

MAHONING CREEK.

DESCRIPTION OF BASIN.

Mahoning Creek, a tributary of the Allegheny River from Armstrong, Jefferson, Clearfield and Indiana counties, drains an area of approximately 425 square miles. Rising in the southwestern part of Clearfield County, this stream flows in a general westerly direction with many windings through a rough, hilly country, to a small extent covered with second growth timber, to its mouth at Mahoning on the Allegheny River, a distance of approximately 65 miles. The headwaters of this stream are barren and not farmed to any considerable extent, but numerous bituminous coal mines are located in this region. In the lower region some farming is carried on. The watershed is sparsely inhabited, although a few large boroughs are located in the valley of the stream. The valley is not wide, the stream in general flowing between hills and often rapid in its descent but at numerous points slow and sluggish. The channel is rocky and usually covered with boulders. The stream is not used for domestic supply but, to some extent, for industrial purposes.

The mean annual precipitation over this watershed is from 40 to 50 inches.

The discharge has been measured since October 18, 1909, at Furnace Bridge (Dee) about two and one-half miles above the mouth.

OHIO BASIN—STATION NO. 14.

MAHONING CREEK AT FURNACE BRIDGE, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, steel, through-truss, highway bridge. 2½ miles above the mouth at Furnace Bridge (Dee), Pa.

RECORDS AVAILABLE—Discharge measurements and discharge table from October 18, 1909, to December 31, 1913, and discharge complete from January 1 to September 30, 1914.

DRAINAGE AREA—420 square miles.

GAGE—A chain gage is attached to the downstream handrail. The length of chain from the bottom of the weight to the marker is 25.22 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is on the downstream right wingwall, top of seventh course below top of wall, downstream edge and at end of sixth course. elevation 18.54 feet above gage datum. Bench Mark No. 2 is top downstream outer corner of course number 6, directly above Bench Mark No. 1, elevation 19.62 feet above gage datum. The gage is read twice daily by track walkers of the P. & S. Railroad Co.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge and by wading at low stages. The initial point for soundings is top edge of left bridge seat.

CHANNEL—The channel is straight above and below the station for 800 feet and 150 feet respectively. The right bank is high and does not overflow. During extreme floods, the water passes around the left end of the bridge. The bed is composed of rocks.

DISCHARGE MEASUREMENTS OF MAHONING CREEK AT FURNACE BRIDGE, ARMSTRONG COUNTY, PA.

(Drainage area 420 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
18	June 25,	Bowen & Taylor, ...	140	259	2.30	3.52	792	0.6 msmt.
19	Aug. 25,	Hosmer & Brady, ...	100	212	0.37	1.69	78	0.6 msmt.

DISCHARGE TABLE FOR MAHONING CREEK AT FURNACE BRIDGE, ARMSTRONG COUNTY, FROM OCT. 18, 1909.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft	Feet.	Sec. ft.	Feet.	Sec. ft.
0.90	6	.90	535	.90	2125	.90	5610	.90	10800
1.00	7	3.00	590	5.00	2240	7.00	5840	9.00	11100
.10	8	.10	650	.10	2360	.10	6070	.10	11400
.20	10	.20	710	.20	2480	.20	6300	.20	11700
.30	15	.30	775	.30	2620	.30	6550	.30	12025
.40	22	.40	840	.40	2780	.40	6800	.40	12350
.50	30	.50	905	.50	2940	.50	7050	.50	12675
.60	40	.60	975	.60	3110	.60	7300	.60	13025
.70	55	.70	1050	.70	3280	.70	7550	.70	13375
.80	75	.80	1125	.80	3460	.80	7800	.80	13750
.90	100	.90	1200	.90	3630	.90	8050	.90	14125
2.00	125	4.00	1280	6.00	3800	8.00	8300	10.00	14500
.10	155	.10	1360	.10	3980	.10	8550	.10	14900
.20	185	.20	1445	.20	4160	.20	8800	.20	15300
.30	225	.30	1 30	.30	4350	.30	9050	.30	15725
.40	270	.40	1620	.40	4650	.40	9325	.40	16150
.50	320	.50	1710	.50	4750	.50	9600	.50	16600
.60	370	.60	1800	.60	4950	.60	9900		
.70	425	.70	1900	.70	5170	.70	10200		
.80	480	.80	2010	.80	5390	.80	10500		

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF MAHONING CREEK AT FURNACE BRIDGE, ARMSTRONG COUNTY, PA.

1914	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT	
DAY.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.
1.	2.57	355	†6.17	4110	†3.42	853	4.93	2160	3.47	886	2.71	430	2.77	464	2.24	201	1.99	122
2.	2.47	306	5.60	3110	3.29	768	5.08	2240	3.27	756	2.61	376	2.77	464	†2.29	221	1.99	122
3.	2.62	381	4.90	2130	3.24	801	4.78	1990	†3.27	756	2.61	376	2.67	408	2.34	243	1.99	122
4.	†2.62	381	4.55	1760	3.34	801	4.43	1650	3.27	756	2.81	486	2.57	355	2.34	243	1.89	98
5.	2.62	381	4.70	1900	3.79	1120	†4.11	1870	3.92	1220	3.16	686	†2.50	320	2.34	243	1.84	85
6.	2.52	330	4.35	1580	3.79	1120	3.78	1110	4.57	1770	3.11	656	2.42	280	2.39	266	†1.79	73
7.	2.62	381	4.00	1280	3.94	1230	3.48	892	4.17	1420	†2.93	552	2.37	256	2.44	290	1.74	63
8.	2.62	381	†3.77	1100	†3.56	947	4.33	1560	3.67	1030	2.76	458	2.32	234	2.44	290	1.74	63
9.	2.32	234	3.75	940	3.19	704	5.08	2240	3.72	1060	2.66	403	2.32	234	†2.52	330	1.74	63
10.	2.07	146	3.45	872	3.39	834	4.63	1830	†3.60	975	2.58	350	2.42	280	2.59	365	1.59	39
11.	†2.85	508	3.05	620	3.44	866	4.18	1430	3.47	886	2.46	300	2.37	256	2.69	420	1.54	34
12.	3.62	990	3.06	620	3.79	1120	†3.83	1150	4.37	1590	2.36	252	†2.47	305	2.64	392	1.54	34
13.	2.07	146	2.95	562	3.44	866	3.48	892	5.52	2970	2.36	252	2.57	355	3.04	614	†1.49	29
14.	2.47	306	2.85	248	3.06	626	3.38	827	5.12	2390	†2.36	252	2.87	518	2.79	474	1.44	25
15.	3.42	853	†2.65	398	†4.35	1580	3.48	892	4.17	1420	2.36	252	3.07	632	2.59	365	1.44	25
16.	3.22	723	2.95	562	5.64	3180	5.58	2990	3.72	1060	2.31	230	2.88	524	†2.54	340	1.44	25
17.	3.02	602	3.05	620	5.69	3260	5.18	2460	†3.57	954	2.26	209	2.73	442	2.49	315	1.44	25
18.	†2.99	584	3.05	620	5.84	3520	4.33	1560	3.42	853	2.21	189	2.96	552	2.39	266	1.44	25
19.	2.97	574	3.20	710	6.49	4730	†4.88	1600	3.12	662	2.31	230	†2.83	496	2.34	243	1.39	21
20.	3.12	662	3.70	1050	6.69	5150	4.43	1650	2.92	546	2.31	230	2.73	442	2.34	243	†1.36	19
21.	2.97	574	3.90	1200	7.14	6160	4.13	1390	2.77	464	†2.56	350	2.68	414	2.39	266	1.34	18
22.	4.57	1770	†3.57	954	†5.19	2480	3.83	1150	2.82	491	2.81	486	2.58	380	2.39	266	1.34	18
23.	4.47	1680	3.25	742	3.24	736	3.58	961	2.87	518	3.11	656	2.48	310	†2.44	290	1.34	18
24.	4.12	1380	3.55	940	3.39	834	3.38	827	†2.82	491	2.86	513	2.33	261	2.49	315	1.34	18
25.	†4.39	1610	3.80	1120	3.79	1120	3.63	998	2.77	464	3.46	879	2.32	238	1.62	43	1.34	18
26.	4.67	1870	2.10	155	4.54	1750	†4.51	1720	2.67	408	3.11	656	†2.33	238	1.64	46	1.34	18
27.	4.27	1500	2.75	1090	5.14	2410	5.38	2750	2.67	408	2.76	458	2.33	238	1.64	46	†1.34	18
28.	5.67	3230	3.65	1010	5.59	3100	4.93	2160	2.77	464	†3.06	626	2.33	238	1.84	85	1.34	18
29.	6.57	4890	.....	.....	†5.82	3480	4.08	1300	2.82	491	3.36	814	2.28	217	2.09	152	1.34	18
30.	7.32	6600	.....	.....	6.04	3870	3.43	860	2.97	572	3.06	626	2.23	197	†2.19	132	1.34	18
31.	6.77	5320	.....	.....	5.79	3490	.....	.....	†2.80	480	.....	.....	2.23	197	2.29	221	.....	.....

†Interpolated. Note—The only available observers for this station are railroad track men and the gage heights are not thoroughly reliable.

ESTIMATED MONTHLY DISCHARGE OF MAHONING CREEK AT FURNACE BRIDGE, ARMSTRONG COUNTY, PA.

(Drainage area 420 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	6600	146	1280	3.048	3.514
February,	4110	155	1140	2.714	2.826
March,	6160	626	2060	4.881	5.627
April,	2980	827	1560	3.714	4.143
May,	2970	408	942	2.243	2.586
June,	879	189	441	1.050	1.171
July,	632	197	346	0.824	0.950
August,	614	43	267	0.636	0.733
September,	122	18	43	0.102	0.114

OHIO BASIN—STATION NO. 15.

ALLEGHENY RIVER AT KITTANNING, PA.

DESCRIPTION OF STATION.

LOCATION—At five span, steel, through-truss, highway bridge at Market Street, Kittanning, Pa.

RECORDS AVAILABLE—Discharge complete from August 18, 1904, to September 30, 1914.

DRAINAGE AREA—9,010 square miles.

GAGE—A standard chain gage is bolted to the upstream handrail in first span from left bank. The length of chain from the bottom of the weight to the marker is 39.54 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is upstream outer corner of top course of stones of left abutment, elevation 33.83 feet above gage datum. The gage is read twice daily by S. C. Carr.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is the left end of handrail, downstream side of bridge.

CHANNEL—The channel is straight above and below the station for 500 feet and 1,000 feet respectively. Both banks are high, clean, and do not overflow. The bed is composed of gravel.

DISCHARGE MEASUREMENTS OF ALLEGHENY RIVER AT KITTANNING, ARMSTRONG COUNTY, PA.

(Drainage area 9,010 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
	1914							
42	June 24,	Bowen & Taylor, ...	670	3198	1.28	3.40	4094	0.6 msmt.
43	Aug. 25,	Hosmer & Brady, ...	610	2288	0.84	2.16	1932	0.6 msmt.

DISCHARGE TABLE FOR ALLEGHENY RIVER AT KITTANNING, ARMSTRONG COUNTY, FROM AUG. 18, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1.00	.....	.10	9685	.10	32875	.10	61600	.10	97590
.10	.....	.20	10080	.20	33050	.20	62410	.20	98590
.20	.....	.30	10535	.30	33725	.30	63220	.30	99590
.30	775	.40	10980	.40	34400	.40	64040	.40	100600
.40	880	.50	11440	.50	35100	.50	64870	.50	101620
.50	990	.60	11900	.60	35800	.60	65700	.60	102640
.60	1100	.70	12370	.70	36500	.70	66540	.70	103670
.70	1220	.80	12840	.80	37200	.80	67390	.80	104710
.80	1340	.90	13315	.90	37900	.90	68240	.90	105750
.90	1465	6.00	13800	10.00	38600	14.00	69100	18.00	106800
2.00	1605	.10	14285	.10	39310	.10	69970	.10	107850
.10	1755	.20	14770	.20	40020	.20	70840	.20	108910
.20	1920	.30	15260	.30	40730	.30	71720	.30	109970
.30	2085	.40	15765	.40	41440	.40	72600	.40	111040
.40	2260	.50	16250	.50	42150	.50	73490	.50	112120
.50	2445	.60	16760	.60	42860	.60	74380	.60	113200
.60	2640	.70	17290	.70	43570	.70	75270	.70	114290
.70	2850	.80	17840	.80	44280	.80	76170	.80	115380
.80	3060	.90	18410	.90	44990	.90	77080	.90	116490
.90	3270	7.00	19000	11.00	45700	15.00	77900	19.00	117600
3.00	3490	.10	19590	.10	46420	.10	78800	.10	118710
.10	3715	.20	20190	.20	47140	.20	79700	.20	119830
.20	3940	.30	20790	.30	47860	.30	80600	.30	120960
.30	4165	.40	21400	.40	48590	.40	81500	.40	122090
.40	4390	.50	22025	.50	49320	.50	82410	.50	123170
.50	4620	.60	22650	.60	50050	.60	83320	.60	124300
.60	4850	.70	23275	.70	50780	.70	84230	.70	125410
.70	5080	.80	23900	.80	51520	.80	85150	.80	126540
.80	5335	.90	24525	.90	52260	.90	86070	.90	127670
.90	5590	8.00	25150	12.00	53000	16.00	87000	20.00	128800
4.00	5840	.10	25800	.10	53750	.10	87980	21.00	140200
.10	6105	.20	26450	.20	54510	.20	88870	22.00	153000
.20	6380	.30	27100	.30	55280	.30	89810	23.00	164200
.30	6660	.40	27750	.40	56060	.40	90760	24.00	176800
.40	6955	.50	28400	.50	56840	.50	91720	25.00	189000
.50	7260	.60	29050	.60	57630	.60	92680	26.00	202000
.60	7600	.70	29700	.70	58420	.70	93650	27.00	217000
.70	7985	.80	30350	.80	59210	.80	94630	28.00	231000
.80	8375	.90	31025	.90	60000	.90	95610	29.00	245000
.90	8775	9.00	31700	13.00	60800	17.00	96600	30.00	259000
5.00	9200								

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF ALLEGHENY RIVER AT KITTANNING, ARMSTRONG COUNTY, PA.

1914	JAN.		FEB.		MARCH.		APRIL.		MAY		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.
1, ...	4.90	8780	16.50	91700	7.50	22000	13.57	65500	7.83	24100	4.93	8900	2.60	2640	1.89	870	2.65	2740
2, ...	5.05	9420	14.60	74400	7.50	22000	13.37	63800	7.23	20400	4.63	7720	2.60	2640	1.37	848	2.60	2640
3, ...	5 40	11000	13.30	63200	7.40	21400	13.67	66300	6.68	17200	4.23	6460	2.50	2440	1.35	828	2.55	4740
4, ...	5.30	10500	12.10	53800	7.40	21400	14.02	69800	5.93	13500	4.28	6600	2.35	2170	1.25	722	2.70	5080
5, ...	5.30	10500	11.50	49300	7.40	21400	13.67	66300	7.23	20400	4.48	7200	2.20	1920	1.20	670	3.75	5200
6, ...	5.60	11900	10.20	40000	7.35	21100	13.27	63000	8.43	27900	4.55	7530	2.20	1920	1.30	775	3.50	4620
7, ...	5.70	12400	9.70	36500	7.30	20800	13.17	62200	10.93	46200	4.30	6660	2.05	1680	1.40	880	3.15	3830
8, ...	5.65	12100	9.40	34400	7.30	20800	13.17	62200	10.53	42400	4.08	5920	2.00	1600	1.35	828	2.90	3270
9, ...	5.60	11900	9.30	33700	7.20	20200	12.87	59800	9.83	37400	3.93	5660	1.95	1540	1.30	775	2.65	2740
10, ...	5.70	12400	9.20	33000	7.15	19900	12.80	59200	9.58	35700	3.63	4920	1.95	1540	1.45	985	2.40	2260
11, ...	5.60	11900	9.05	32000	7.20	20200	12.50	56800	10.08	39200	3.53	4690	1.80	1540	1.55	1040	2.30	2060
12, ...	5.50	11400	8.90	31000	7.40	21400	12.30	55300	11.38	48400	3.18	3900	1.80	1340	1.76	1290	2.05	1680
13, ...	5.35	10800	8.80	30400	7.60	22800	12.70	58400	19.38	122000	2.98	3450	2.10	1760	2.00	1600	1.95	1540
14, ...	5.30	10500	8.60	29000	7.90	24500	13.30	63200	18.08	108000	2.93	3340	2.35	2170	1.95	1540	1.85	1400
15, ...	5.80	12900	8.50	28400	8.10	25800	13.70	66500	16.38	90600	2.83	3120	2.50	2440	1.80	1340	1.75	1280
16, ...	6.05	14000	8.50	28400	9.30	33700	14.10	70000	14.85	76600	2.66	2770	2.75	2960	1.65	1160	1.65	1160
17, ...	6.20	14800	8.40	27800	14.60	74400	12.30	55300	13.65	59000	2.51	2460	2.70	2850	1.55	1040	1.60	1100
18, ...	5.90	13300	8.40	27800	11.20	47100	10.90	45000	10.75	43900	2.41	2230	2.80	3060	1.45	935	1.55	1040
19, ...	5.75	12600	8.30	27100	9.80	37200	10.15	39700	8.85	30700	2.41	2280	2.55	2540	1.45	935	1.50	990
20, ...	5.60	11900	8.30	27100	9.20	33000	9.60	35800	7.70	23300	2.41	2280	2.25	2000	1.65	1160	1.50	990
21, ...	5.50	11400	8.25	26800	9.00	31700	9.05	32000	6.65	17000	2.41	2280	2.05	1680	1.55	1040	1.40	880
22, ...	5.40	11000	8.20	26400	8.80	30400	8.65	29400	6.00	13800	2.66	2770	1.85	1400	1.95	1540	1.35	828
23, ...	5.40	11000	8.20	26400	8.90	31000	8.30	27100	5.65	12100	3.51	4640	1.85	1400	1.85	1400	1.30	775
24, ...	5.50	11400	8.10	25800	9.30	33700	8.10	25800	5.35	10800	3.28	4120	1.80	1340	1.85	1400	1.35	828
25, ...	5.90	13300	7.90	24500	9.97	38400	7.90	24500	4.65	7790	3.52	4670	1.65	1160	2.14	1820	1.40	880
26, ...	6.40	15800	7.70	23300	10.47	41900	9.05	32000	4.55	7430	3.57	4730	1.60	1100	2.70	2850	1.40	880
27, ...	6.70	17300	7.70	23300	12.27	55000	11.15	46800	4.45	7110	3.00	3490	1.30	775	2.80	3060	1.35	828
28, ...	8.70	28700	7.60	22600	14.67	75000	10.30	40700	4.55	7430	2.90	3270	1.50	990	2.80	3060	1.30	775
29, ...	13.65	66100	.....	.....	†21.72	149000	8.80	30400	4.45	7110	3.15	3830	1.40	880	2.80	3060	1.30	775
30, ...	16.60	92700	.....	.....	18.47	112000	8.35	27400	4.65	7790	2.75	2960	1.40	880	2.90	3270	1.30	775
31, ...	17.20	98600	.....	.....	14.97	77700	.....	.....	4.95	8990	.....	.....	1.35	828	2.85	3160	.....	.....

†Max. 23.10' at 11 a. m.=165000 sec. ft. From Mar. 25 to Apr. 9 inclusive, readings taken on pier gage.

ESTIMATED MONTHLY DISCHARGE OF ALLEGHENY RIVER AT KITTANNING, ARMSTRONG COUNTY, PA.

(Drainage area 9,010 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	98600	8780	19800	2.198	2.534
February,	91700	22600	35600	3.951	4.114
March,	165000	19900	39600	4.395	5.067
April,	70000	25500	50000	5.549	6.191
May,	122000	7110	33300	3.696	4.261
June,	8900	2280	4500	0.499	0.557
July,	3060	775	1770	0.196	0.226
August,	3270	670	1480	0.164	0.189
September,	5200	775	1950	0.216	0.241

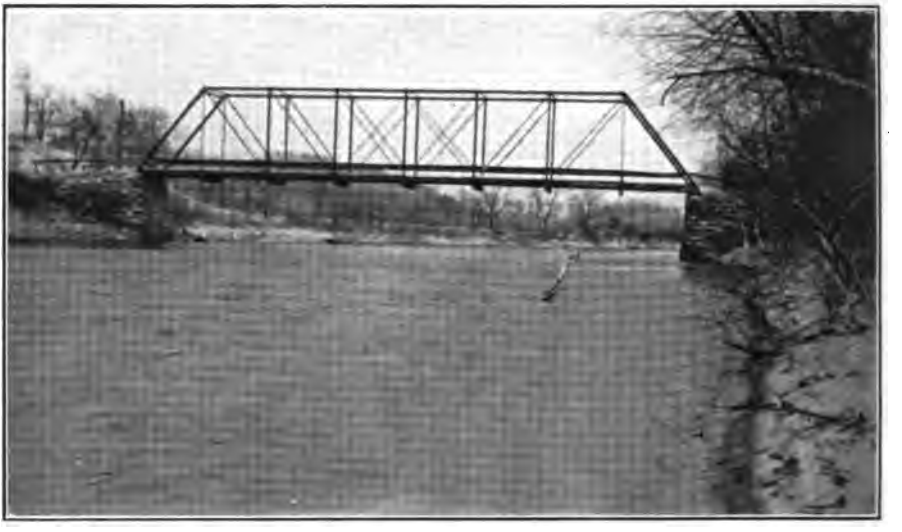
Note.—From Mar. 25 to April 9 inclusive, readings taken on pier gage.

CROOKED CREEK.

DESCRIPTION OF BASIN.

Crooked Creek, a tributary of the Allegheny River in Armstrong County, drains approximately 290 square miles. Rising in numerous branches in the west central part of Indiana County, it follows first a general southwesterly course through a coal mining and farming region to the Indiana-Armstrong county line, and then turns northwest through a sparsely settled farming region to its mouth at Rosstown, a total distance of approximately 54 miles.

This basin is largely deforested, and in some sections the hillsides are bare. The elevation of the source of Crooked Creek is about 1400 feet, and of the mouth 786 feet. Near the headwaters the slope is steep, averaging in seven and one-half miles about 40 feet per mile, while below this point to its mouth, a distance of approximately 46 miles, there is a uniform slope of 7 feet per mile. The principal tributaries are Plum and Cherry creeks. This creek flows in a broad valley, which lies about 300 to 400 feet below the elevation of the adjacent hills, the bottom is stony and the stream tortuous in its course.



Gaging Station on Crooked Creek at Hileman's Farm.

Crooked Creek Looking Upstream from Gaging Station at Hileman's Farm.

Numerous farming and coal mining villages lie in this drainage area, and some of these obtain water supplies from the stream or its tributaries. The stream proper is badly polluted by effluents from coal washing at the mines.

The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge has been measured since October 16, 1909, at Hileman's Farm, approximately 3 miles above the mouth.

OHIO BASIN—STATION NO. 16.

CROOKED CREEK AT HILEMAN'S FARM, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, steel, through-truss, highway bridge, about 3 miles above the mouth, and about 3½ miles from Ford City.

RECORDS AVAILABLE—Discharge complete from October 16, 1909, to September 30, 1914.

DRAINAGE AREA—279 square miles.

GAGE—A standard chain gage is attached to the eyebar on the upstream side of the bridge. The length of chain from the bottom of the weight to the marker is 22.01 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is on top of stone in upstream face of wingwall of right abutment 2 inches from right end of stone. Stone is seventh course down from bridge seat, and eighth stone in from face, 6 feet, more or less, down from top of wall, elevation 12.95 feet above gage datum. The gage is read twice daily by J. T. Hileman.

DISCHARGE MEASUREMENTS—Discharge measurements are taken from the downstream side of the bridge and by wading at low stages. The initial point for soundings is top edge of bridge seat, right abutment.

CHANNEL—The channel above and below the station is straight for 800 feet and 500 feet respectively. Both banks are high and not subject to overflow. The bed is composed of rock and the section is deep and the current sluggish.

DISCHARGE MEASUREMENTS OF CROOKED CREEK AT HILEMAN'S FARM, ARMSTRONG COUNTY, PA.

(Drainage area 279 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
15	June 24,	Rowen & Taylor, ...	132	297	0.18	1.55	52	0.6 msmt.
16	Aug. 11,	Wilson & Taylor, ...	39	19	0.95	1.17	18	Wading 800' below bridge.

DISCHARGE TABLE FOR CROOKED CREEK AT HILEMAN'S FARM. ARMSTRONG COUNTY, FROM OCT. 16, 1909.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft
0.00	.....	.20	205	.40	1850	.60	4480	.80	8500
.10	.....	.30	240	.50	1980	.70	4620	.90	8700
.20	.....	.40	278	.60	2070	.80	4770	9.00	8900
.30	.....	.50	318	.70	2180	.90	4920	.10	9100
.40	.....	.60	359	.80	2300	7.00	5070	.20	9300
.50	2	.70	403	.90	2420	.10	5230	.30	9500
.60	2	.80	451	5.00	2530	.20	5390	.40	9700
.70	2	.90	500	.10	2640	.30	5560	.50	9900
.80	3	3.00	555	.20	2750	.40	5730	.60	10100
.90	5	.10	620	.30	2860	.50	5910	.70	10300
1.00	7	.20	690	.40	2980	.60	6100	.80	10500
.10	11	.30	770	.50	3090	.70	6300	.90	10700
.20	18	.40	850	.60	3200	.80	6500	10.00	10900
.30	26	.50	940	.70	3320	.90	6700	.10	11100
.40	36	.60	1030	.80	3440	8.00	6900	.20	11300
.50	48	.70	1120	.90	3560	.10	7100	.30	11500
.60	61	.80	1220	6.00	3680	.20	7300	.40	11700
.70	77	.90	1320	.10	3810	.30	7500	.50	11900
.80	97	4.00	1420	.20	3940	.40	7700	.60	12100
.90	120	.10	1520	.30	4070	.50	7900		
2.00	145	.20	1630	.40	4200	.60	8100		
.10	174	.30	1740	.50	4340	.70	8300		

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF CROOKED CREEK AT HILEMAN'S FARM, ARMSTRONG COUNTY, PA.

1914	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.
1,	3.10	620	4.07	1490	.....	250	3.73	1150	2.44	294	1.30	26	2.02	151	.....	.....	1.20	18
2,	3.10	620	3.27	746	.....	250	3.43	877	2.29	236	1.20	18	1.87	113	.....	.....	1.20	18
3,	2.90	500	2.87	485	.....	250	3.06	607	2.09	171	1.10	11	1.62	64	.....	.....	1.10	11
4,	2.35	259	2.72	413	.....	250	2.88	490	2.34	255	2.55	338	1.47	44	.....	.....	1.10	11
5,	2.35	259	2.67	390	.....	250	2.88	490	2.49	314	2.25	222	1.47	44	.....	.....	1.10	11
6,	2.00	145	2.57	347	.....	250	2.78	441	2.84	471	1.85	108	1.37	33	.....	.....	1.35	31
7,	2.35	259	2.57	347	.....	250	2.98	544	2.79	446	1.60	61	1.32	28	.....	.....	1.45	42
8,	4.00	1420	2.52	326	.....	250	2.88	490	3.19	683	1.55	54	1.27	24	.....	.....	1.40	36
9,	6.20	3940	2.62	368	.....	250	3.48	928	2.99	550	1.45	43	1.27	24	.....	.....	1.40	36
10,	3.95	1370	*	250	.....	250	3.33	794	2.74	422	1.45	43	1.07	10	.....	.....	1.35	31
11,	3.40	850	.....	250	.....	250	2.83	466	3.69	1110	1.35	31	1.42	38	1.25	22	1.35	31
12,	3.30	770	.....	250	.....	250	2.73	417	4.14	1560	1.35	31	‡	.....	2.65	381	1.30	26
13,	*	300	.....	250	.....	250	2.53	330	4.74	2230	1.30	26	.....	.....	2.10	174	1.35	31
14,	.....	300	.....	250	.....	250	2.78	441	5.89	3550	1.25	22	.....	.....	1.65	69	1.30	26
15,	.....	300	.....	250	4.88	2400	3.88	1300	6.04	3730	1.25	22	.....	.....	1.50	48	1.30	26
16,	.....	300	.....	250	6.53	4380	†4.88	2400	5.84	3490	1.25	22	.....	.....	1.11	12	1.25	23
17,	.....	300	.....	250	6.33	4110	4.63	2100	3.79	1210	1.05	9	.....	.....	1.80	97	1.20	18
18,	.....	300	.....	250	5.83	3480	3.83	1250	3.19	683	1.00	7	.....	.....	1.55	64	1.30	26
19,	.....	300	.....	250	5.23	2780	2.98	544	2.89	495	1.10	11	.....	.....	1.10	11	1.35	31
20,	.....	300	.....	250	4.08	1500	3.18	676	2.69	399	1.15	14	.....	.....	1.20	18	1.25	22
21,	.....	300	.....	250	3.43	877	3.13	641	2.33	274	1.60	61	.....	.....	1.25	23	1.35	31
22,	4.90	2420	.....	250	2.88	490	2.73	417	2.04	157	1.50	48	.....	.....	1.05	9	1.30	26
23,	5.40	2980	.....	250	2.78	441	2.53	310	1.79	95	1.45	42	.....	.....	1.30	26	1.25	22
24,	4.50	1960	.....	250	2.63	372	2.88	490	1.74	85	1.50	48	.....	.....	1.30	26	2.80	451
25,	4.40	1850	.....	250	2.48	310	3.08	574	1.64	67	1.36	32	.....	.....	1.15	14	2.20	205
26,	3.35	810	.....	250	3.23	714	3.58	1010	1.64	67	1.36	32	.....	.....	1.15	14	1.80	97
27,	3.35	810	.....	250	3.88	1300	3.78	1200	1.54	53	1.31	27	.....	.....	1.40	36	1.45	42
28,	4.45	1900	.....	250	4.18	1610	3.68	1100	1.79	95	1.76	89	.....	.....	1.45	42	1.35	31
29,	5.25	2800	.....	.....	5.98	3660	2.88	490	2.14	186	2.11	177	.....	.....	1.35	31	1.30	26
30,	4.75	2240	.....	.....	5.13	2670	2.68	394	1.69	75	2.26	226	.....	.....	1.30	26	1.15	14
31,	4.45	1900	.....	.....	4.28	1720	.....	.....	1.39	35	.....	.....	.....	.....	1.25	22	.....	.....

* Creek frozen Jan. 13-21 inclusive, Feb. 10-Mar. 14 inclusive, and discharge estimated from climatological records. †Max. 5.53′ at 5 p. m.=3120 sec. ft.
‡Gage out July 12-Aug. 10 inclusive, on account of repairs to bridge.

ESTIMATED MONTHLY DISCHARGE OF CROOKED CREEK AT HILEMAN'S FARM, ARMSTRONG COUNTY, PA.

(Drainage area 279 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	3940		1080	3.871	4.463
February,	1490		345	1.237	1.288
March,	4330		1170	4.194	4.835
April,	3120	330	779	2.792	3.115
May,	3730	35	758	2.717	3.133
June,	338	7	63	0.226	0.252
September,	451	11	48	0.172	0.192

Creek frozen January 13-21 inclusive; February 10-March 14 inclusive, and discharge estimated from climatological records.
During July and August the gage was out on account of repairs to bridge.

STONY CREEK.

DESCRIPTION OF BASIN.

Stony Creek rises in central Somerset County at Berlin on the divide between the Allegheny, Youghiogheny, Juniata and Potomac drainage basins at an elevation of 2300 feet and flows in a general northerly direction through Somerset and Cambria counties to its mouth at Johnstown where, together with the Little Conemaugh River, it forms the Conemaugh River at an elevation of 1160 feet. It is 34 miles long and, from a point 7 miles below its source for 12 miles to the mouth of Quemahoning Creek, it has a slope of 55.5 feet per mile, thence to Johnstown, a distance of 15 miles, the slope is 24.7 feet per mile.

The stream drains a total of 466 square miles through an elevated and rolling plateau, bordered on the east by the Allegheny Mountains and on the west by Laurel Ridge. In these mountains are extensive soft coal mines, whose wastes pollute the stream. In addition to coal mining there is some agriculture carried on in the valleys and there are large steel works in Johnstown. During times of drought, the main stream is used for industrial supply, while Quemahoning, Shade, Paint and Bens creeks, its principal tributaries, are used for

domestic and industrial supplies in the mining districts and at Johnstown. The stream is also used for the development of electricity and for power by small grist mills.

The mean annual precipitation over this watershed is from 45 to 50 inches.

The discharge of this creek has been measured since June 18, 1913, at Johnstown.

OHIO BASIN—STATION NO. 17.

STONY CREEK AT JOHNSTOWN, PA.

DESCRIPTION OF STATION.

LOCATION—On Poplar Street Bridge, Johnstown, Pa.

RECORDS AVAILABLE—Discharge measurements; gage heights from January 1 to September 30, 1914.

DRAINAGE AREA—465 square miles.

GAGE—A vertical chain gage is fastened to a bridge post, downstream truss. The length of chain from the bottom of the weight to the marker is 23.24 feet. The elevation of zero is 1154 feet above sea level. Bench Mark No. 1 is top of last iron pin on concrete wall, left side, immediately below bridge (stands out of wall on top), elevation 1173.63 feet above sea level. Bench Mark No. 2 is northwest corner of third step of Emerlings Brewery, elevation 1174.57 feet above sea level. Bench Mark No. 3 is on downstream corner of wingwall on right bank on top of fifth course from top, elevation 1170.315 feet above sea level. The gage is read once daily by J. T. Griffith.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is creek side of iron post on right bank, at end of iron handrail.

CHANNEL—The channel is straight for 1,000 feet above and 500 feet below the station. Both banks are high and do not overflow. The bed is stony.

DISCHARGE MEASUREMENTS OF STONY CREEK AT JOHNSTOWN, CAMBRIA COUNTY, PA.

(Drainage area 465 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec	Feet.	Sec. ft.	
	1913							
1	Aug. 15,	Boehringer, ...	132	62	0.84	1.07	52	Wading msmt.
	1914							
2	July 6,	Wilson & Taylor, ...	86	262	1.77	2.18	465	0.6 msmt.
3	Sept. 21,	Bowen & Brady, ...	129	67	0.58	0.96	39	Surf. msmt.

DAILY MEAN GAGE HEIGHTS OF STONY CREEK AT JOHNSTOWN, CAMBRIA COUNTY, PA.

1914. DAY.	JAN. G. H.	FEB. G. H.	MAR. G. H.	APR. G. H.	MAY. G. H.	JUNE G. H.	JULY G. H.	AUG. G. H.	SEPT. G. H.
1,	*1.59	‡5.60	‡2.00	5.71	3.21	1.47	2.17	1.05	0.97
2,	1.59	4.80	1.82	7.02	2.92	1.37	2.22	‡1.08	0.94
3,	1.69	4.18	2.10	6.12	‡2.68	1.22	1.92	1.10	0.94
4,	‡1.74	3.95	2.28	5.41	2.44	1.17	‡1.96	1.10	0.94
5,	1.79	3.80	2.00	‡4.61	2.51	2.97	‡2.03	1.10	0.94
6,	1.69	3.35	2.09	3.81	5.83	2.12	2.09	1.10	0.96
7,	1.69	3.10	2.02	3.52	4.11	‡1.83	1.86	1.10	0.92
8,	1.79	‡2.84	‡1.96	3.46	3.45	1.54	1.61	1.10	0.89
9,	2.09	*2.58	1.90	4.01	3.63	1.42	1.53	‡1.10	0.89
10,	3.09	2.46	1.80	3.31	‡3.28	1.72	1.48	1.10	0.89
11,	‡3.05	2.40	1.92	3.63	2.93	1.70	1.44	1.08	0.89
12,	3.01	2.20	1.72	‡3.32	2.80	1.52	‡1.63	1.28	0.89
13,	*2.09	2.18	1.82	3.01	2.91	1.34	1.83	1.3,	‡0.89
14,	2.31	1.90	1.80	2.79	2.76	1.26	1.91	1.25	0.89
15,	2.51	‡1.54	‡3.76	5.55	2.43	1.17	2.11	1.22	0.88
16,	2.40	1.19	5.72	†7.13	2.31	1.12	2.21	‡1.12	0.8:
17,	2.39	2.09	7.30	5.41	‡2.13	0.97	1.83	1.02	0.88
18,	‡2.29	2.00	6.93	4.59	2.06	0.92	1.58	1.02	0.88
19,	2.19	4.50	6.33	‡4.45	2.01	0.92	‡1.45	1.00	0.87
20,	2.29	4.45	4.95	4.31	1.91	0.91	1.36	1.00	‡0.87
21,	5.19	4.05	4.20	5.11	1.83	0.96	1.16	1.00	0.87
22,	3.87	‡2.88	‡4.11	4.23	1.76	1.02	1.13	1.00	0.87
23,	3.89	3.72	4.02	4.76	1.71	1.42	1.11	1.01	0.87
24,	4.29	3.52	3.10	3.41	1.65	1.13	1.16	1.02	0.87
25,	‡4.14	3.40	3.80	4.89	1.59	5.82	1.21	1.00	0.87
26,	3.99	3.00	5.82	§5.51	1.51	3.12	‡1.23	1.00	0.87
27,	3.61	2.82	6.30	5.73	1.51	2.97	1.26	1.00	‡0.87
28,	4.09	2.18	7.10	4.51	1.96	§4.52	1.21	0.98	0.87
29,	6.41	.....	‡6.98	4.33	1.86	4.02	1.06	1.00	0.87
30,	6.79	.....	¶6.87	3.51	‡1.66	2.87	1.01	‡1.00	0.87
31,	5.99	.....	6.78	.....	.....	.....	0.96	1.00	.....

*Creek frozen Jan. 1 to 3 inclusive, Jan. 13 to 16 inclusive, Feb. 9 to Mar. 16 inclusive. ¶Max. 7.85 at 6 p. m. †Max. 7.51 at 6 p. m. ‡Interpolated. §Estimated.

BLACK LICK CREEK.

DESCRIPTION OF BASIN.

Black Lick Creek, one of the largest of the tributaries of the Conemaugh River, is formed by the junction of the North and South branches on the line between Indiana and Cambria counties at Vintondale. It thence flows westerly through the southern part of Indiana County for about 26 miles to its mouth near Blairsville. The total drainage area tributary above its mouth is 412 square miles. The North Branch rises in the southwestern part of Carroll Township, at an elevation of 2000 feet, and is 16 miles long, draining 70 square miles, and the latter rises in the northern part of Cambria Township and is approximately the same length, draining 48 square miles.

In its extreme upper portion the North Branch flows through a steep mountainous country, while the lower portion contains more cleared land, is more inhabited and the hills are lower and less steep. The watershed of the South Branch is similar but is more inhabited and includes considerable bituminous coal, which is being actively mined.

The valley of the main creek is rather broad, with numerous wide flat areas, similar to the one at its junction with its chief tributary, Two Lick Creek, at Josephine. The rounded hills, which rise some 400 to 500 feet on either side are often wooded.

Below the forks of the North and South branches and extending to its mouth and up Two Lick Creek, is an extensive bituminous coal field. The main valleys are largely under cultivation, but numerous tributaries drain areas densely covered with second growth.

The slope between the forks and mouth is 18.3 feet per mile, quite sluggish at some points and exceedingly rapid at others.

The North and South branches and Two Lick Creek are all used for domestic and industrial supply as well as certain other tributaries, while the use of water from the main stream and the tributaries by coal mines, steel works, etc., is extensive.

The mean annual precipitation over this watershed is from 40 to 50 inches.

The discharge has been measured since August 16, 1904, at Black Lick, just below the mouth of Two Lick Creek.

OHIO BASIN—STATION NO. 18.

BLACK LICK CREEK AT BLACK LICK, PA.

DESCRIPTION OF STATION.

LOCATION—On three span, steel, through-truss, highway bridge, ¼ mile from railroad station at Black Lick, Indiana County.

RECORDS AVAILABLE—Discharge complete from August 16, 1904, to December 31, 1905, and from January 8, 1907, to September 30, 1914.

DRAINAGE AREA—386 square miles.

GAGE—A standard chain gage is attached to the upstream handrail. The length of chain from the bottom of the weight to the

marker is 20.63 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is nail in first maple tree from door of Maynard's house, 1 foot above ground, driven horizontally, and bent over 1 inch from head, elevation 13.92 feet above gage datum. Bench Mark No. 2 is heads of four spikes driven into the root of large maple 45 feet from edge of low water and about 190 feet upstream from bridge, elevation 12.96 feet above gage datum. Bench Mark No. 3 is upper edge of horizontal cross plate at elevation of guard rail on upstream side of bridge, 4.3 feet from initial point for soundings, elevation 14.43 feet above gage datum. Bench Mark No. 4 is a point encircled by red paint about one-half foot from end of upstream left wingwall on fifth course below top, elevation 12.668 feet above gage datum. The gage is read twice daily by Mrs. D. J. Walling.

DISCHARGE MEASUREMENTS—Taken from the upstream side of the highway bridge at ordinary stages, from coal tipple ¼ mile above bridge at high stages, by wading above bridge at lowest stages. The initial point for soundings at the highway bridge is first angle post in upstream handrail at left bank.

CHANNEL—The channel is straight above the station for 2,000 feet and below the station for 250 feet. The right bank is not subject to overflow. The left bank overflows at gage height 11.5 feet. The bed is composed of gravel, sand, and boulders.

DISCHARGE MEASUREMENTS OF BLACK LICK CREEK AT BLACK LICK, INDIANA COUNTY, PA.

(Drainage area 386 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
28	Jan. 16,	Hosmer, ...	204	589	0.97	3.49	574	0.6 msmt.
29	July 10,	Wilson & Taylor, ...	201	248	0.44	2.45	110	Wading msmt. 250 ft. above bridge.
30	Aug. 26,	Hosmer & Brady, ...	197	303	0.11	2.19	33	Surf. msmt.

DISCHARGE TABLE FOR BLACK LICK CREEK AT BLACK LICK, INDIANA COUNTY, FROM JAN. 1, 1912.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1.90	8	.20	1140	.50	4455	.80	9320	.10	15210
2.00	21	.30	1230	.60	4655	.90	9540	.20	15500
.10	38	.40	1320	.70	4855	9.00	9760	.30	15795
.20	59	.50	1420	.80	5060	.10	9980	.40	16090
.30	83	.60	1520	.90	5270	.20	10220	.50	16390
.40	110	.70	1620	7.00	5480	.30	10460	.60	16690
.50	140	.80	1730	.10	5690	.40	10700	.70	16995
.60	172	.90	1845	.20	5900	.50	10950	.80	17300
.70	205	5.00	1960	.30	6110	.60	11200	.90	17610
.80	240	.10	2080	.40	6320	.70	11450	12.00	17920
.90	280	.20	2230	.50	6530	.80	11700	.10	18235
3.00	320	.30	2375	.60	6740	.90	11950	.20	18550
.10	365	.40	2525	.70	6950	10.00	12200	.30	18895
.20	415	.50	2680	.80	7160	.10	12460	.40	19240
.30	470	.60	2840	.90	7370	.20	12720	.50	19585
.40	535	.70	3000	8.00	7580	.30	12985	.60	19980
.50	590	.80	3165	.10	7790	.40	13250	.70	20285
.60	660	.90	3335	.20	8000	.50	13525	.80	20640
.70	730	6.00	3510	.30	8220	.60	13800	.90	21020
.80	805	.10	3690	.40	8440	.70	14080	13.00	21400
.90	885	.20	3875	.50	8660	.80	14360		
4.00	965	.30	4060	.60	8880	.90	14640		
.10	1050	.40	4255	.70	9100	11.00	14920		

Note.—This table is only applicable subsequent to Jan. 1, 1912, and is based on 5 discharge measurements made during 1912-1913, together with former curve.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF BLACK LICK CREEK AT BLACK LICK, INDIANA COUNTY, PA.

1914	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.
1,	3.06	347	6.06	3620	.....	300	4.83	1760	3.65	695	2.63	182	2.69	202	2.13	44	2.29	81
2,	3.00	320	5.24	2290	.....	300	5.45	2600	3.45	558	2.58	166	2.87	268	2.08	35	2.27	76
3,	3.27	454	4.47	1890	.....	300	4.99	1950	3.29	464	2.51	143	2.86	264	2.23	66	2.32	88
4,	3.38	514	3.90	885	.....	300	4.54	1460	3.21	420	2.81	244	2.67	195	2.33	91	2.27	76
5,	3 10	365	4.18	1120	.....	300	4.26	1190	4.36	1280	3.94	917	2.52	146	2.23	66	2.22	64
6,	3.07	352	3.92	901	.....	300	3.99	957	‡6.44	4330	3.17	400	2.91	284	2.18	55	2.17	53
7,	3.08	356	3.84	837	.....	300	3.84	837	4.95	1900	2.86	264	2.61	175	2.23	66	2.15	48
8,	3.08	356	3.56	682	.....	300	3.99	957	4.51	1430	2.74	219	2.51	143	2.13	44	2.17	53
9,	3.39	520	3.39	470	.....	300	4.39	1310	4.46	1380	2.63	182	2.48	134	2.18	55	2.13	44
10,	4.72	1640	3.32	481	.....	300	4.04	999	4.05	1019	2.58	166	2.44	122	2.36	99	2.07	33
11,	4.07	1020	3.27	454	.....	300	3.89	877	3.81	813	2.51	143	2.40	110	2.34	94	2.09	36
12,	3.73	752	3.20	415	.....	300	3.99	957	4.38	1310	2.49	137	2.30	83	2.63	182	2.09	36
13,	3.48	577	*	400	.....	300	3.79	796	6.16	3800	2.43	119	2.45	125	2.74	219	2.07	33
14,	3.63	681	.....	400	.....	300	3.63	674	4.96	1910	2.35	96	3.10	365	2.50	140	2.05	29
15,	3.56	632	.....	400	.....	300	4.83	1760	4.41	1330	2.33	91	3.16	396	2.40	110	2.03	26
16,	3.49	584	.....	400	.....	300	†6.59	4640	4.00	965	2.26	74	2.85	260	2.28	78	2.07	33
17,	3.62	674	.....	400	.....	300	5.83	3220	3.76	775	2.29	81	3.10	365	2.19	67	2.03	26
18,	3.22	426	.....	400	6.58	4620	4.96	1910	3.51	597	2.25	71	3.95	925	2.17	53	1.99	20
19,	3.12	375	.....	400	5.30	2330	4.75	1680	3.33	486	2.23	66	3.16	396	2.32	88	1.97	17
20,	3.38	514	.....	400	4.60	1520	4.56	1480	3.19	410	2.24	69	2.78	233	2.07	33	2.01	23
21,	4.65	1570	.....	350	4.08	1080	4.63	1550	3.09	360	2.26	78	2.70	205	2.13	44	1.98	18
22,	4.38	1300	.....	350	3.90	885	4.43	1350	3.00	320	2.32	88	2.49	137	2.49	137	1.92	11
23,	4.39	1310	.....	350	3.88	869	4.31	1240	2.92	288	2.43	119	2.48	134	2.25	71	1.93	12
24,	4.33	1260	.....	350	3.69	723	4.01	974	2.83	252	2.42	116	2.44	122	2.20	59	2.00	21
25,	4.75	1680	.....	350	3.87	861	3.66	702	2.77	230	2.83	252	2.43	119	2.25	71	1.97	17
26,	4.34	1270	.....	350	4.75	1680	5.65	2920	2.70	205	2.63	182	2.41	113	2.13	55	1.99	20
27,	4.12	1070	.....	350	5.30	2390	5.03	2000	2.67	195	2.39	107	2.35	96	2.17	53	2.13	44
28,	4.62	1540	.....	350	6.26	4180	4.51	1430	3.01	324	4.98	1940	2.34	94	2.12	42	1.98	18
29,	5.82	3200	.....	.....	5.43	2570	4.17	1110	3.68	716	3.49	584	2.34	94	2.25	71	1.98	18
30,	5.82	3200	.....	.....	5.64	2900	3.91	893	2.99	316	2.93	292	2.25	71	2.62	179	2.05	30
31,	5.80	3160	.....	.....	5.48	2650	.....	.....	2.75	222	.....	.....	2.15	48	2.45	125	.....	.....

*Creek frozen Feb. 13 to Mar. 17 inclusive, and discharge estimated from climatological records. †Max. 6.96 at 7 a. m.=5330 sec. ft. ‡Max. 7.16 at 7 a. m. =5820 sec. ft.

ESTIMATED MONTHLY DISCHARGE OF BLACK LICK CREEK AT BLACK LICK, INDIANA COUNTY, PA.

(Drainage area 386 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	3200	320	1030	2.668	3.076
February,	3620	.....	696	1.803	1.877
March,	4620	.....	1110	2.876	3.316
April,	5380	674	1540	3.990	4.452
May,	5820	196	945	2.448	2.823
June,	1940	66	253	0.655	0.730
July,	925	48	207	0.536	0.618
August,	219	33	83	0.215	0.248
September,	88	11	37	0.096	0.107

Creek frozen Feb. 13 to Mar. 17 inclusive, and discharge estimated from climatological records.

KISKIMINITAS RIVER.

DESCRIPTION OF BASIN.

The Kiskiminitas River is the largest tributary of the Allegheny, and joins it near Freeport, approximately 30 miles above Pittsburgh, in the northwestern corner of Westmoreland County. It is known by this name as far as the mouth of Loyalhanna Creek, 27 miles up, above which point it is called the Conemaugh River. The total drainage area of the stream is 1892 square miles.

The Conemaugh River proper is formed by the junction of the Little Conemaugh and Stony Creek at Johnstown. The former rises in the western slope of the Alleghenies, on the eastern boundary of Cambria County, and flows northwesterly for about 30 miles to Johnstown. Stony Creek rises in the high ridges of Somerset County, and flows northerly for about 40 miles to Johnstown. Both are rapid mountain streams, with steep slopes, rocky beds, and abrupt valleys. Their watersheds have been practically deforested, although the higher ridges are well timbered now with second growth. The watershed of Little Conemaugh River, including about 188 square miles, is densely inhabited, lying in the Cambria County bituminous coal field, and contains large areas of agricultural land. The Stony Creek watershed is much less densely populated, although the Somerset County coal field, in the lower section, supports a large population. The upper watershed is sparsely inhabited, but little farmed, and

contains considerable forest areas. The headwaters of both streams rise at an elevation of about 2300 feet, and at Johnstown are at elevation 1160 feet.

Below Johnstown the river follows a winding course in a general northwesterly direction, between precipitous banks and high timbered hillsides, and over a rocky bed, its slope to the mouth of Loyalhanna Creek, 50 miles, being 6.8 feet per mile. From this latter point to the mouth at Freeport on the Allegheny River, the slope is at the rate of approximately 4 feet per mile.

The most important tributaries below Johnstown are Black Lick Creek, drainage area approximately 412 square miles, from the north near Blairsville, and Loyalhanna Creek, from the southeast. Both of these streams drain thickly populated and well cultivated areas, containing large bituminous coal fields.

The stream is lined with railroads, towns and industrial plants, while numerous coal mines are operated on the bordering hills and in the valleys of its tributaries.

The Kiskiminitas River carries vast quantities of alluvial material washed from its banks, and from the cultivated fields in its watershed, and is usually of a yellow color, due to this cause, and to the sulphur in the coal mine water of which it receives a considerable amount.

The tributaries of the Little Conemaugh above Johnstown are almost without exception used for water supply purposes, some of these containing large storage basins. At a point a short distance above Johnstown this stream has been known to be absolutely dry in seasons of draught. The lower tributaries of Stony Creek, and the tributaries of the Conemaugh are similarly almost all in use for domestic or industrial supply. The main river is little used for domestic supply, but many large industrial plants use it.

The mean annual precipitation over this watershed is from 40 to 50 inches.

The discharge has been measured since May 29, 1907, at Avonmore, approximately 24 miles above its mouth.

OHIO BASIN—STATION NO. 19.

KISKIMINITAS RIVER AT AVONMORE, PA.

DESCRIPTION OF STATION.

LOCATION—On highway bridge on road leading to P. R. R. Station, Avonmore, about ¼ mile from village of Avonmore, Westmoreland County.

RECORDS AVAILABLE—Discharge complete from May 29, 1907, to September 30, 1914.

DRAINAGE AREA—1,720 square miles.

GAGE—A standard chain gage is fastened to the downstream hand-rail. The length of chain from the bottom of the weight to the marker is 40.30 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is outer downstream corner of right stone masonry bridge seat marked B. M., elevation 33.267 feet above gage datum. Bench Mark No. 2 is east rail of west track of highway crossing, elevation 35.034 feet above gage datum. The gage is read twice daily by Ralph Fickes.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is left face of lower right masonry guard fence of approach to bridge.

CHANNEL—The channel above and below the station is straight for 400 feet and 300 feet respectively. The right bank is high and rocky. The left bank is low and liable to overflow. The bed is soft and sandy.

DISCHARGE MEASUREMENTS OF KISKIMINITAS RIVER AT AVONMORE, WESTMORELAND COUNTY, PA.

(Drainage area 1,720 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
	1914							
29	June 26.	Bowen & Taylor, ...	391	1153	1.69	4.61	1946	0.6 mamt.
30	Aug. 26.	Hosmer & Brady, ...	185	313	0.99	2.42	311	0.6 mamt.

DISCHARGE TABLE FOR KISKIMINITAS RIVER AT AVONMORE, WESTMORELAND COUNTY, FROM JAN. 1, 1913.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1.00	.....	.30	5010	.90	16180	.10	33475	25.00	5 920
.50	45	.40	5140	.99	16430	.20	33820	.10	56340
.60	55	.50	5270	.40	16680	.30	34165	.20	56760
.70	70	.60	5400	.50	16930	.40	34510	.30	57180
.80	90	.70	5540	.60	17180	.50	34860	.40	57600
.90	115	.80	5680	.70	17480	.60	35210	.50	58020
2.00	145	.90	5820	.80	17680	.70	35565	.60	58440
.10	175	8.00	5960	.90	17935	.80	35920	.70	58860
.20	205	.10	6110	14.00	18190	.90	36275	.80	59280
.30	245	.20	6260	.10	18445	20.00	36630	.90	59700
.40	285	.30	6410	.20	18700	.10	36985	26.00	60120
.50	330	.40	6560	.30	18955	.20	37340	.10	60540
.60	375	.50	6710	.40	19210	.30	37700	.20	60960
.70	425	.60	6860	.50	19470	.40	38060	.30	61380
.80	480	.70	7010	.60	19730	.50	38425	.40	61800
.90	540	.80	7160	.70	19990	.60	38790	.50	62220
3.00	600	.90	7310	.80	20255	.70	39155	.60	62640
.10	665	9.00	7460	.90	20520	.80	39520	.70	63060
.20	735	.10	7620	15.00	20790	.90	39885	.80	63480
.30	805	.20	7780	.10	21065	21.00	40250	.90	63900
.40	875	.30	7950	.20	21345	.10	40615	27.00	64320
.50	945	.40	8120	.30	21630	.20	40980	.10	64740
.60	1015	.50	8290	.40	21920	.30	41345	.20	65160
.70	1090	.60	8460	.50	22210	.40	41710	.30	65580
.80	1165	.70	8630	.60	22500	.50	42075	.40	66000
.90	1245	.80	8800	.70	22790	.60	42440	.50	66420
4.00	1325	.90	8980	.80	23080	.70	42805	.60	66840
.10	1410	10.00	9170	.90	23375	.80	43175	.70	67260
.20	1500	.10	9360	16.00	23670	.90	43545	.80	6 680
.30	1590	.20	9550	.10	23965	22.00	43920	.90	68100
.40	1680	.30	9740	.20	24260	.10	44295	28.00	68520
.50	1770	.40	9980	.30	24555	.20	44670	.10	6 940
.60	1880	.50	10120	.40	24850	.30	45046	.20	69360
.70	1955	.60	10320	.50	25150	.40	45425	.30	69780
.80	2050	.70	10520	.60	25450	.50	45805	.40	70200
.90	2150	.80	10720	.70	25750	.60	46185	.50	70620
5.00	2250	.90	10920	.80	26050	.70	46570	.60	7 040
.10	2355	11.00	11120	.90	26355	.80	46955	.70	71460
.20	2465	.10	11330	17.00	26660	.90	47340	.80	71880
.30	2575	.20	11540	.10	26965	23.00	47730	.90	72300
.40	2685	.30	11750	.20	27270	.10	48120	29.00	72720
.50	2800	.40	11970	.30	27575	.20	48510	.10	73140
.60	2915	.50	12190	.40	27885	.30	48905	.20	73560
.70	3030	.60	12410	.50	28195	.40	49305	.30	73985
.80	3145	.70	12630	.60	28510	.50	49705	.40	74410
.90	3260	.80	12860	.70	28830	.60	50110	.50	74835
6.00	3380	.90	13090	.80	29150	.70	50515	.60	75260
.10	3500	12.00	13320	.90	29475	.80	50925	.70	7 690
.20	3620	.10	13555	18.00	29800	.90	51335	.80	76120
.30	3740	.20	13790	.10	30125	24.00	51750	.90	76550
.40	3865	.30	14025	.20	30450	.10	52165	30.00	76980
.50	3990	.40	14260	.30	30780	.20	52580	.10	77415
.60	4115	.50	14495	.40	31110	.30	52995	.20	77850
.70	4240	.60	14730	.50	31445	.40	53410	.30	78285
.80	4365	.70	14970	.60	31780	.50	53825	.40	7 720
.90	4490	.80	15210	.70	32115	.60	5 240	.50	79160
7.00	4620	.90	15450	.80	32450	.70	54660	.60	79600
.10	4750	13.00	15690	.90	32790	.80	55080	.70	80040
.20	4880	.10	15935	19.00	33130	.90	55 00	31.00	81360
								32.00	85760

Note.—This table is only applicable subsequent to Jan. 1, 1913, and is based on 11 discharge measurements made in 1912-13 and 14.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF KISKIMINITAS RIVER AT AVONMORE, WESTMORELAND CO., PA.

1914	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.
1,	4.79	2040	12.21	13800	.....	1500	10.65	10400	6.37	3330	3.33	826	4.18	1490	2.39	281	2.80	490
2,	4.64	1810	9.51	8310	.....	1500	11.90	13100	5.85	3200	3.25	770	3.91	1250	2.37	273	2.78	469
3,	4.59	1850	8.21	6280	.....	1500	11.35	11900	5.37	2650	3.08	652	3.76	1140	2.31	249	2.80	490
4,	4.69	1950	7.64	5460	.....	1500	10.02	9210	5.05	2300	3.15	700	3.51	952	2.39	281	2.72	436
5,	4.61	1870	7.39	5130	.....	1500	8.70	7010	5.82	3170	6.51	2810	3.66	1060	2.47	316	2.62	385
6,	4.54	1810	6.77	4330	.....	1500	7.75	5610	12.86	15300	4.91	2160	3.76	1140	2.37	273	2.58	366
7,	4.44	1720	6.27	3700	.....	1500	7.00	4620	9.21	7930	3.98	1310	3.37	854	2.34	261	2.52	339
8,	4.41	1690	6.07	3460	.....	1500	6.92	4520	7.97	5920	3.61	1020	3.08	652	2.34	261	2.45	308
9,	4.75	2.00	*	2000	.....	1500	7.92	5850	8.02	5980	3.35	840	3.08	639	2.47	316	2.50	330
10,	8.30	6410	.....	2000	.....	1500	7.10	4750	7.05	4680	3.25	770	2.86	516	2.49	326	2.50	330
11,	7.79	5670	.....	2000	.....	1500	6.50	3990	6.39	3850	3.43	896	2.76	458	2.59	1010	2.50	330
12,	6.77	4330	.....	2000	.....	1500	6.51	4000	6.59	4100	3.28	791	2.63	415	2.59	1010	2.45	308
13,	*	3270	.....	2000	.....	1500	6.41	3880	9.75	8720	3.08	652	2.94	564	3.27	784	2.45	308
14,	.....	3270	.....	2000	.....	1500	6.89	4250	8.07	6060	2.91	546	3.44	903	3.01	606	2.45	308
15,	.....	3270	.....	2000	.....	1500	6.21	3630	6.95	4560	2.73	442	3.91	1250	2.74	447	2.38	277
16,	.....	3270	.....	2000	14.42	19300	†14.25	18800	6.12	3520	2.68	415	3.45	910	2.64	395	2.45	308
17,	.....	3270	.....	2000	16.18	24200	10.87	10900	5.59	2900	2.65	400	3.58	1000	2.44	308	2.40	285
18,	.....	3270	.....	2000	14.38	19200	9.19	7760	5.22	2490	2.63	390	4.18	1480	2.34	261	2.38	277
19,	.....	3270	.....	2000	11.30	11800	8.77	7120	4.87	2120	2.63	390	3.84	1200	2.34	261	2.40	285
20,	.....	3270	.....	2000	9.25	7860	8.34	6470	4.57	1830	2.61	380	3.21	742	2.31	249	2.40	285
21,	.....	3270	.....	2000	7.92	5850	9.67	8580	4.35	1640	2.56	352	2.94	564	2.34	261	2.40	285
22,	.....	3270	.....	2000	7.60	5400	8.34	6470	4.19	1490	2.76	452	2.84	504	2.47	316	2.32	253
23,	7.61	5410	.....	2000	7.20	4880	7.64	5460	4.09	1400	2.83	498	2.66	405	2.51	334	2.42	294
24,	7.77	5640	.....	2000	6.42	3890	6.84	4420	5.89	3250	2.95	570	2.58	366	2.44	308	2.48	321
25,	8.94	7370	.....	2000	6.55	4060	6.49	3980	3.67	1070	5.68	3010	2.74	447	2.19	202	2.48	321
26,	8.34	6470	.....	2000	8.58	6830	10.99	11100	3.62	1030	4.70	1960	2.66	405	2.30	245	2.40	285
27,	7.49	5260	.....	2000	10.82	10800	11.07	11200	3.49	933	3.65	1050	2.66	405	2.30	245	2.40	285
28,	7.97	5920	.....	2000	12.85	14100	8.99	7440	3.59	1010	9.18	7750	2.61	390	2.30	245	2.35	265
29,	10.87	10900	.....	.....	12.72	15000	7.84	5740	4.09	1400	7.58	5310	2.46	312	2.60	375	2.26	229
30,	12.09	13500	.....	.....	10.82	10800	7.09	4740	4.59	1850	5.15	2410	2.44	308	2.84	504	2.38	277
31,	11.11	11400	.....	.....	13.48	16800	.....	.....	3.69	1080	.....	.....	2.36	269	2.88	528	.....	.....

*River frozen Jan. 13 to 22 inclusive, Feb. 9 to Mar. 15 inclusive, and discharge estimated from Black Lick Creek at Black Lick and climatological records. †Maximum 15.01 at 8.30 a. m.=20600 sec. ft.

ESTIMATED MONTHLY DISCHARGE OF KISKIMINITAS RIVER AT AVONMORE, WESTMORELAND COUNTY, PA.

(Drainage area 1,720 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	13500	1690	4440	2.581	2.975
February,	13800	.....	3230	1.878	1.956
March,	24200	.....	6560	3.814	4.397
April.	20800	3250	7200	4.186	4.671
May,	15300	938	3590	2.087	2.406
June,	7750	352	1350	0.785	0.876
July,	1480	269	741	0.431	0.497
August	1010	202	378	0.220	0.254
September,	480	229	324	0.188	0.210

River frozen Jan. 13 to 22 inclusive, Feb. 9 to Mar. 15 inclusive, and discharge estimated from Black Lick Creek at Black Lick and climatological records.

WEST FORK RIVER.

DESCRIPTION OF BASIN.

The West Fork River rises in the western part of Upshur County, W. Va., and flows northwestward into Lewis County, thence flowing in a slight northeasterly direction to its junction with the Tygart River near Fairmount, W. Va.

Its length is approximately seventy miles and its drainage area, above the mouth, is about 845 square miles. The elevation of the hills at the source is about 1500 feet, while at its mouth the elevation is about 860 feet. It flows through a broad valley, the bordering hills being steep and precipitous and slightly forested. There are no lakes, ponds or swamps on the drainage area. There are numerous tributaries, the largest of which are Ten Mile Creek, Simpson Creek and Stone Coal Creek. Its watershed is underlain by very valuable and extensive coal beds and contains oil and gas in abundance. There are several large towns in the drainage area, the most important of which are Clarksburg and Weston.

Little water power has been developed, although the main stream and its tributaries afford ample opportunity.

The mean annual precipitation over this watershed is between 45 and 50 inches.

The discharge has been measured since 1907, at Enterprise, W. Va., 33 miles above the mouth.

OHIO BASIN—STATION NO. 20.

WEST FORK RIVER AT ENTERPRISE, W. VA.

DESCRIPTION OF STATION.

LOCATION—On steel highway bridge at Enterprise, W. Va., about 12 miles above the mouth.

RECORDS AVAILABLE—Discharge complete from June 2, 1907, to September 30, 1914.

DRAINAGE AREA—750 square miles.

GAGE—A standard chain gage is attached to the bridge. The elevation of zero is 869.91 feet above sea level. The length of chain from the bottom of the weight to the marker is 37.95 feet. Bench Mark No. 1 is the northeast corner of the left abutment, downstream side, elevation 33.70 feet above gage datum. Bench Mark No. 2 is the northwest corner of the downstream end of the pier, elevation 33.87 feet above gage datum.

DISCHARGE MEASUREMENTS—Taken from the downstream side of bridge at ordinary stages, and by wading 200 feet above at low stages.

CHANNEL—The channel is broken by one pier. Both banks are high and not subject to overflow. The bed is composed of smooth rock and permanent.

REMARKS—There is a small dam located at Worthington, W. Va., about three miles below the station, but backwater does not reach to the section. The following data have been furnished by the United States Geological Survey, who maintain and operate this station.

DISCHARGE TABLE FOR WEST FORK RIVER AT ENTERPRISE, W. VA., FROM JUNE 2, 1907, TO SEPT. 30, 1914.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
0.00	0	.60	489	.10	2270	.60	4850	.10	7792
.10	1	.70	540	.20	2362	.70	4960	.20	7914
.20	2	.80	593	.30	2456	.80	5070	.30	8036
.30	4	.90	649	.40	2552	.90	5180	.40	8158
.40	6	3.00	707	.50	2650	8.00	5290	.50	8280
.50	9	.10	767	.60	2750	.10	5400	.60	8404
.60	12	.20	829	.70	2850	.20	5510	.70	8528
.70	16	.30	893	.80	2950	.30	5625	.80	8652
.80	20	.40	959	.90	3050	.40	5740	.90	8776
.90	25	.50	1026	6.00	3150	.50	5855	11.00	8900
1.00	30	.60	1094	.10	3252	.60	5970	.10	9025
.10	36	.70	1163	.20	3356	.70	6085	.20	9150
.20	43	.80	1233	.30	3460	.80	6200	.30	9275
.30	53	.90	1304	.40	3564	.90	6320	.40	9400
.40	64	4.00	1377	.50	3670	9.00	6460	.50	9525
.50	79	.10	1451	.60	3776	.10	6580	.60	9650
.60	99	.20	1526	.70	3882	.20	6700	.70	9775
.70	124	.30	1602	.80	3988	.30	6820	.80	9900
.80	155	.40	1680	.90	4094	.40	6940	.90	10025
.90	190	.50	1759	7.00	4200	.50	7060	12.00	10150
2.00	227	.60	1840	.10	4308	.60	7182	13.00	11450
.10	268	.70	1922	.20	4416	.70	7304	14.00	12750
.20	307	.80	2006	.30	4524	.80	7426	15.00	14100
.30	350	.90	2092	.40	4632	.90	7548	16.00	15450
.40	395	5.00	2180	.50	4740	10.00	7670	17.00	16850
.50	441								

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF WEST FORK RIVER AT ENTERPRISE, W. VA., FOR THE YEAR ENDING SEPTEMBER 30, 1914.

DAY.	OCT.		NOV.		DEC.		JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	1.40	64	2.0	227	2.5	441	3.2	829	5.9	3050	8.5	4000	3.7	1160	3.1	767	1.37	60	1.21	44	1.57	98	1.96	213
2,	1.40	64	.....	176	2.65	514	3.0	707	4.9	2090	4.4	1680	8.6	5970	2.8	593	1.37	60	1.27	49	1.56	91	1.81	158
3,	1.50	79	1.70	124	2.75	566	3.0	707	3.9	1300	4.4	1680	8.5	5860	2.65	514	1.34	57	1.37	60	1.49	78	1.71	127
4,	1.40	64	1.50	79	2.85	621	3.4	959	3.5	1030	4.2	1530	6.4	3560	2.45	418	1.47	74	1.37	60	1.46	73	1.60	99
5,	1.40	64	1.70	124	2.7	540	3.8	1230	3.35	926	3.9	1300	5.1	2270	2.8	593	2.2	307	1.38	62	1.44	70	1.53	85
6,	1.40	64	1.55	89	2.55	465	4.0	1380	3.8	1230	4.3	1600	3.8	1230	8.7	6080	1.77	146	1.39	63	1.42	67	1.47	74
7,	1.50	79	1.58	95	5.8	2950	4.2	1530	5.2	2360	6.6	3780	3.45	992	5.7	2950	1.62	104	1.32	54	1.39	68	1.44	70
8,	1.50	79	1.50	79	7.6	4850	4.4	1680	4.8	2010	6.1	3250	3.35	925	4.2	1530	1.52	88	1.25	48	1.34	57	1.38	62
9,	1.50	64	2.1	266	5.9	3050	7.2	4420	3.6	1090	5.7	2850	6.6	3780	3.6	1090	1.47	74	1.25	48	1.36	59	1.37	60
10,	1.40	64	2.9	649	4.6	1840	11.8	9900	3.1	767	5.0	2180	5.5	2650	3.2	829	1.42	67	1.23	46	1.36	59	1.36	59
11,	1.50	79	3.5	1830	4.0	1380	7.5	4740	3.1	2100	4.2	1530	4.2	1530	2.8	593	1.42	67	1.00	30	1.42	67	1.35	58
12,	1.40	64	4.4	1680	3.8	1230	5.4	2550	3.2	2100	4.7	1920	3.7	1160	2.6	489	1.45	72	1.02	31	1.95	208	1.35	58
13,	1.40	64	5.	2360	3.1	767	3.9	1300	3.7	2100	4.3	1600	3.35	926	2.45	418	1.55	89	1.10	36	2.0	227	1.34	57
14,	1.40	64	12.0	11400	2.85	621	4.0	650	3.5	2100	4.2	1530	3.15	798	2.35	372	1.50	79	1.20	43	3.35	926	1.34	57
15,	1.40	89	14.7	12400	2.7	540	4.6	700	3.5	2100	7.1	4310	3.1	767	2.2	307	1.44	70	2.35	372	3.05	737	1.32	54
16,	1.40	64	13.2	19400	2.6	489	3.45	992	3.4	2100	8.1	5400	6.5	3870	2.1	266	1.41	66	1.35	172	2.85	621	1.27	49
17,	1.45	7	15.1	14600	2.45	418	3.7	1160	3.3	2100	6.5	3870	6.0	3150	2.0	227	1.27	49	1.70	124	1.86	176	1.27	49
18,	1.55	89	7.0	4200	2.3	350	3.8	1230	.....	2100	5.7	2850	4.9	2090	1.92	197	1.19	42	1.58	95	1.71	127	1.36	48
19,	1.65	172	4.6	1840	2.25	328	3.9	1300	3.8	2100	5.3	2460	4.9	2090	1.85	172	1.77	146	1.67	116	1.51	81	1.26	48
20,	1.85	172	3.8	1230	2.15	286	4.0	1380	16.4	2100	4.5	1760	4.3	2010	1.73	132	1.25	48	1.79	152	1.33	62	1.24	47
21,	4.7	1920	3.15	798	2.25	328	7.0	4200	7.9	2100	3.9	1300	8.8	6200	1.72	130	1.32	54	1.38	119	1.31	53	1.22	45
22,	4.7	1920	2.8	593	2.3	350	5.9	3050	5.2	2100	3.8	1230	5.3	2950	1.68	119	1.39	63	1.56	91	1.28	50	1.21	44
23,	3.6	1090	2.6	489	2.4	396	4.4	1680	4.8	2100	3.8	1230	4.4	1630	1.65	112	1.37	60	1.48	76	1.27	49	1.19	42
24,	2.55	465	2.45	418	5.0	2180	3.9	1300	4.7	2100	3.9	1300	3.6	1080	1.60	99	1.30	52	1.46	73	1.26	43	1.19	42
25,	3.4	959	2.3	350	7.5	4740	8.7	6080	5.8	2100	4.0	1380	3.25	861	1.55	89	1.30	52	1.65	112	1.18	43	1.18	42
26,	5.8	2950	2.2	307	10.7	8530	6.8	3990	5.7	2100	4.0	1380	5.0	2180	1.49	78	1.26	48	1.61	102	3.05	737	1.16	40
27,	5.2	2360	2.2	307	8.3	5630	7.0	2180	.....	2100	3.6	1090	7.8	5070	1.52	83	1.22	45	1.58	95	2.7	540	1.16	40
28,	3.9	1300	2.35	372	6.8	3990	4.0	1380	6.7	2100	4.2	1530	5.4	2550	1.42	67	1.20	43	1.61	102	2.45	418	1.15	40
29,	3.0	707	2.45	418	4.6	1840	3.5	1030	.....	2100	4.0	1380	3.9	1300	1.36	59	1.18	42	2.1	266	2.4	395	1.15	40
30,	2.5	441	2.5	441	3.7	1160	2.2	307	.....	2100	3.9	1300	3.3	893	1.35	58	1.15	40	1.81	158	2.3	350	1.12	37
31,	2.2	307	.....	.....	3.4	595	3.1	767	.....	.....	4.4	1680	....	.....	1.32	54	....	.....	1.66	114	2.05	246	....	.....

Probable back water due to ice Feb. 11-March 1.

ESTIMATED MONTHLY DISCHARGE OF WEST FORK RIVER AT ENTERPRISE, W. VA.

(Drainage area 750 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1913.					
October,	2950	64	516	0.688	0.79
November,	19400	79	2610	3.48	3.88
December,	8530	286	1690	2.25	2.59
1914.					
January,	9900	307	2110	2.81	3.24
February,	.....	.....	1920	2.56	2.67
March,	.....	1090	2120	2.83	3.26
April,	6200	767	2380	3.17	3.54
May,	6080	54	625	.833	.96
June,	307	40	75.3	.100	.11
July,	372	30	97.2	.130	.15
August,	926	42	22.2	.296	.34
September,	212	37	64.8	.086	.10
The year,	19400	30	1190	1.59	21.63

TYGART RIVER.

DESCRIPTION OF BASIN.

The Tygart, also called Tygart's Valley River, rises in the southern part of Randolph County, W. Va., and flows in a general northerly direction to its junction with the West Fork River, near Fairmount, W. Va.

Its length is approximately one hundred miles while its drainage area, above the mouth, is approximately 1,420 square miles. The elevation of the hills at the source is approximately 3500 feet, while at its mouth the elevation is about 860 feet. In the upper portions the country is mountainous, the slopes of the valleys steep and, in many places, precipitous and the fall of the stream is rapid. As the river approaches its confluence with the West Fork it flows through a rolling country. There are no lakes, ponds or swamps on the drainage area and the flow is flashy. There are many tributaries, the largest of which are Buchanan River and Middle Fork River. Its watershed is underlain by very valuable and extensive coal beds and contains oil and gas in abundance. At the headwaters there is still some timber, but over the general basin the mountains are sparsely forested. There are several large towns in the drainage basin, the most important of which are Grafton and Phillipi. Little

water power has been developed although the main stream and its tributaries afford ample opportunity.

The mean annual precipitation over this watershed is from 45 to 50 inches.

The discharge has been measured since 1907, at Fetterman and Bellington, W. Va.

OHIO BASIN—STATION NO. 21.

TYGART RIVER AT FETTERMAN, W. VA.

DESCRIPTION OF STATION.

LOCATION—On iron highway bridge about 1,000 feet from B. & O. Railroad Station at Fetterman, W. Va., about 18 miles above the mouth.

RECORDS AVAILABLE—Discharge complete from June 3, 1907, to September 30, 1914.

DRAINAGE AREA—1,340 square miles.

GAGE—A chain gage is located on the left of the middle pier on the downstream side. The elevation of zero is 957.86 feet above sea level. The length of chain from the bottom of the weight to the marker is 36.13 feet. Bench Mark No. 1 is southwest corner of lower right abutment of bridge, marked with black paint, elevation 31.46 feet above gage datum. Bench Mark No. 2 is the northeast corner of upstream end of pier, elevation 31.44 feet above gage datum. The gage is read by Joseph Gerken.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is face of right abutment, downstream side.

CHANNEL—The channel is straight for 500 feet above and below the station. Both banks are high and not subject to overflow. The bed is hard and firm.

REMARKS—The following data have been furnished by the United States Geological Survey, who maintain and operate this station.

DISCHARGE TABLE FOR TYGART RIVER AT FETTERMAN, W. VA., FROM OCT. 1, 1913, TO SEPT. 30, 1914.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
2.80	20	.70	1160	.60	4380	.50	7975	.40	11770
.90	25	.80	1300	.70	4560	.60	8170	.50	11975
3.00	41	.90	1450	.80	4740	.70	8365	.60	12180
.10	61	5.00	1610	.90	4930	.80	8560	.70	12385
.20	81	.10	1780	7.00	5100	.90	8755	.80	12590
.30	106	.20	1950	.10	5290	9.00	8950	.90	12795
.40	136	.30	2120	.20	5480	.10	9150	11.00	13000
.50	171	.40	2290	.30	5670	.20	9350	.10	13206
.60	211	.50	2460	.40	5860	.30	9550	.20	13412
.70	256	.60	2630	.50	6050	.40	9750	.30	13618
.80	306	.70	2800	.60	6240	.50	9950	.40	13824
.90	366	.80	2970	.70	6430	.60	10150	.50	14030
4.00	441	.90	3140	.80	6620	.70	10350	.60	14236
.10	526	6.00	3310	.90	6810	.80	10550	.70	14442
.20	613	.10	3480	8.00	7000	.90	10750	.80	14648
.30	708	.20	3660	.10	7195	10.00	10950	.90	14854
.40	809	.30	3840	.20	7390	.10	11155	12.00	15060
.50	910	.40	4020	.30	7585	.20	11360		
.60	1080	.50	4200	.40	7780	.30	11565		

Note.—The above table is not applicable for ice or obstructed channel conditions. It is based on 4 discharge measurements made during Oct., 1913, and Dec., 1914, and the form of the old curve, and is fairly well defined between gage heights 3.5 feet and 6.0 feet. Above gage height 11.9 feet the rating curve is the same as that dated June 3, 1907, to Sept. 30, 1913.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF TYGART RIVER AT FETTERMAN, W. VA., FOR THE YEAR ENDING SEPTEMBER 30, 1914.

DAY.	OCT.		NOV.		DEC.		JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1.	3.72	266	4.7	1160	5.0	1610	5.5	2460	6.7	4560	4.6	1080	8.2	7890	5.6	2630	3 52	179	3.72	286	3.88	354	4.32	722
2.	3.62	220	4.5	910	4.95	1530	5.4	2290	6.9	4920	5.0	1610	9.5	9960	5.2	1950	3.48	.....	3.68	247	3.70	256	4.18	596
3.	3.68	247	4.35	752	4.9	1450	5.4	2290	5.8	2970	5.05	1700	11.4	12800	5.0	1610	3.46	.....	3.60	211	3.55	191	4.05	484
4.	3.85	336	4.22	631	4.9	1450	5.2	1950	5.5	2460	5.0	1610	11.0	13000	4.85	1380	3.42	.....	3.52	179	3.42	.....	3.92	381
5.	4.6	1030	4.20	613	5.05	1700	5.1	1780	5.6	2630	5.1	1780	8.3	7580	5.6	2630	3.58	426	3.50	171	3.45	.....	3.78	296
6.	5.1	1780	4.18	596	4.9	1450	5.0	1610	5.8	2970	5.15	1860	6.7	4560	7.8	6620	3.92	331	3.50	171	3.32	.....	3.68	247
7.	4.55	970	4.12	543	5.2	1960	5.0	1610	6.1	3480	5.3	2120	5.9	3140	7.8	6620	3.78	296	3.50	171	3.28	.....	3.62	220
8.	3.64	229	4.10	526	9.1	9150	5.05	1700	6.4	4020	5.6	2630	5.7	2800	6.8	4740	3.75	281	3.62	220	3.25	.....	3.55	191
9.	3.26	.....	4.15	570	7.8	6620	6.4	4020	5.9	3140	5.2	1950	6.1	3480	6.6	4380	3.70	256	3.60	211	3.25	.....	3.52	179
10.	3.62	220	6.2	3660	6.5	4200	9.8	10600	5.6	2630	5.1	1780	7.7	6480	6.8	4740	3.62	220	3.50	171	3.25	.....	3.48	.....
11.	4.32	722	6.7	4560	6.0	3310	10.1	11200	5.4	2290	5.4	2290	6.5	4200	5.6	2630	3.58	208	3.42	.....	3.38	.....	3.45	.....
12.	4.6	1030	6.3	3840	5.6	2630	7.9	6810	5.3	2120	5.5	2460	6.1	3488	4.9	1450	3.50	171	3.28	.....	3.72	266	3.40	.....
13.	4.9	1450	8.2	7390	5.3	2120	5.8	2970	5.1	1780	5.35	2200	6.0	3310	4.7	1160	3.42	.....	3.38	.....	3.90	366	3.38	.....
14.	4.7	1160	16.8	26200	5.1	1780	5.15	1860	4.8	1300	5.3	2120	5.9	3140	4.55	970	3.40	.....	3.70	256	4.35	752	3.32	.....
15.	4.5	910	19.0	31600	5.0	1610	5.15	1860	4.6	1030	6.2	3660	6.7	4560	4.5	910	3.32	.....	6.8	4740	4.5	910	3.30	.....
16.	4.35	752	22.0	39100	4.85	1330	5.25	2040	4.55	970	9.7	10400	9.1	9150	4.42	822	3.28	.....	5.9	3140	4.15	570	3.22	.....
17.	4.18	596	16.2	24800	4.7	1160	5.2	1950	4.55	970	11.1	13200	10.5	12000	4.30	703	3.25	.....	5.3	2120	4.02	458	3.20	.....
18.	3.92	381	11.0	13000	4.7	1160	4.9	1450	4.65	1100	10.0	11000	9.3	9550	4.22	631	3.25	.....	4.95	1530	3.92	381	3.18	.....
19.	3.88	354	8.3	7580	4.7	1160	4.85	1380	11.7	14400	8.2	7390	7.0	6100	4.12	543	3.22	.....	4.8	1300	3.78	296	3.15	.....
20.	5.4	2290	6.1	3480	4.6	1030	5.05	1700	13.6	18700	7.1	5290	9.6	10200	4.18	596	3.25	.....	4.6	1080	3.68	247	3.15	.....
21.	8.0	7000	5.8	2970	4.6	1030	8.3	7580	11.1	13200	6.3	3840	12.4	15900	4.15	570	3.30	.....	4.38	781	3.52	179	3.15	.....
22.	7.3	5670	5.5	2460	4.6	1030	11.1	13200	9.3	9550	5.8	2970	9.2	9350	4.00	441	3.28	.....	4.35	752	3.42	.....	3.15	.....
23.	6.2	3660	5.2	1950	4.7	1160	8.8	8560	7.8	6620	5.7	2800	7.1	5290	3.88	354	3.20	.....	4.02	458	3.40	.....	3.10	.....
24.	5.6	2630	4.9	1450	5.2	1950	7.9	6810	6.3	3840	5.6	2630	5.8	2970	3.85	336	3.38	.....	3.72	286	3.40	.....	3.10	.....
25.	7.5	6050	4.75	1230	5.6	2630	7.4	5860	5.4	2290	6.0	3310	5.6	2630	3.82	318	3.58	208	3.58	208	3.45	.....	3.10	.....
26.	9.5	9950	4.6	1030	10.2	11400	8.1	7200	4.15	570	7.3	5670	7.3	5670	3.72	266	4.42	822	3.40	.....	3.95	404	3.10	.....
27.	9.3	9550	4.6	1030	9.4	9750	7.3	5670	4.28	685	7.5	6050	12.8	16800	3.70	256	5.0	1610	6.2	3660	3.98	426	3.08	.....
28.	7.4	5860	4.7	1160	8.5	7980	6.6	4380	4.35	752	8.1	7200	8.7	8360	3.70	256	4.40	800	5.6	2630	4.05	484	2.98	.....
29.	5.7	3800	4.9	1450	6.7	4560	6.0	3310	.....	.....	8.1	7200	6.7	4560	3.70	256	3.85	336	5.3	2120	4.42	822	2.92	.....
30.	5.2	1960	5.0	1610	5.8	2970	5.8	2970	.....	.....	7.4	5860	6.0	3310	3.68	247	3.78	286	4.9	1450	4.6	1030	2.90	.....
31.	4.95	1530	.....	.....	5.6	2630	6.0	3310	.....	.....	6.6	4380	....	.....	3.62	220	....	.....	4.28	685	4.48	888	....	.....

Daily discharge below gage height 3.5, will not be published unless rating curve is checked by measurement below that stage.

ESTIMATED MONTHLY DISCHARGE OF TYGART RIVER AT FETTERMAN, W. VA.

(Drainage area 1,340 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1913.					
October,	9950	96	2310	1.72	1.98
November,	39100	526	6260	4.67	5.21
December,	11400	1030	3080	2.30	2.65
1914.					
January,	13200	1380	4270	3.19	3.68
February,	18700	570	4140	3.09	3.23
March,	13200	1030	4190	3.13	3.61
April,	16800	2630	7060	5.27	5.88
May,	6620	220	1650	1.23	1.42
June,	1610	81	274	0.204	0.23
July,	4740	101	956	0.713	0.82
August,	1030	94	347	0.259	0.30
September,	722	35	169	0.126	0.14
The year,	39100	35	2880	2.15	29.14

Note.—Monthly means obtained by assuming that rating table holds for discharges below gage height 3.5′ but daily discharges below gage height 3.5′ will not be published unless rating curve is checked by measurement below that stage.

CHEAT RIVER.

DESCRIPTION OF BASIN.

The Cheat River, or its uppermost branch, the Shavers Fork, rises in the northern part of Pocahontas County, W. Va., and flows in a general northwesterly direction to its mouth in the Monongahela River, at Point Marion, Fayette County, Pa., about 90 miles below Pittsburgh, Pa., a distance of approximately 157 miles, 4 miles of which is in Pennsylvania. It drains an area of approximately 1,427 square miles, of which 98 lie in Pennsylvania. The source is in the point of coalescence of Back Allegheny Mountain and Cheat Mountain, at elevation of approximately 4500 feet, from which it falls to elevation 780 feet at its mouth, the total fall being 3720 feet, or at the rate of 23.6 feet per mile. The river proper, which is formed by the junction of Shavers Fork and Dry Fork, at Parsons, W. Va., is at elevation 1625 feet, and has a slope of approximately 11 feet per mile to its mouth, a distance of about 78 miles. The drainage basin of Shavers Fork is very long and narrow, while that of Dry Fork is notably fan-shaped. The headwaters of this river lie in a rough, mountainous region, many of the valleys being in deep gorges, with

swiftly flowing mountain streams. The Cheat River, from the source of Shavers Fork for half its length, lies in a narrow steep sided and uncultivated gorge, with the mountain slopes heavily timbered. Above Parsons, W. Virginia, for a distance of a few miles, the valley opens out with the stream flowing through low bottom land or flood plains. Below this point for a distance of 9 miles it passes through a steep-sided, broad valley, with cultivated and unusually level bottoms, the course of the stream being very tortuous. From this point to Mount Chateau, W. Va., there are numerous small patches of cultivated bottom land, while below this point the river then enters Pennsylvania through another gorge, which extends to its mouth.

Owing to the fact that the basin of this stream is long and narrow, being 100 miles in length by about 14 miles in width, together with other topographical features, conducive to the same result, the Cheat River has a rapidly, fluctuating discharge, rising quickly in great floods, and reducing rapidly thereafter.

Approximately three-fourths of the entire drainage area is reported to be forest covered and coal is mined over a large portion of this watershed. There are very few towns of importance in this drainage basin, the largest being Rowlesburg and Parsons, W. Va., and Point Marion, Pa., which latter community uses this stream as a source of domestic water supply.

The mean annual precipitation over this watershed is from approximately 40 to 45 inches.

The discharge has been measured since July, 1899, at Ice's Ferry, near Morgantown, W. Va.

OHIO BASIN—STATION NO. 22.

CHEAT RIVER NEAR MORGANTOWN, W. VA.

DESCRIPTION OF STATION.

LOCATION—On highway bridge at Uneva, W. Va., 10 miles above the mouth of the river.

RECORDS AVAILABLE—Discharge complete from July 8 to December 30, 1899; July 1 to December 29, 1900; August 21, 1902 to December 31, 1905; and November 18, 1908 to September 30, 1914.

DRAINAGE AREA—1,380 square miles.

GAGE—A standard chain gage is attached to the bridge. The length of chain from the bottom of the weight to the marker is 40.73 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is a mark on face of sandstone rock in edge of bank beside road, 20 feet downstream and 30 feet back from gage, elevation 21.13 feet above gage datum. The gage is read by C. F. Baker.

DISCHARGE MEASUREMENTS—Taken from the upstream side of the bridge, or by wading during low water.

CHANNEL AND WINTER FLOW—The channel is probably permanent. Ice forms sometimes to a thickness of several inches, and large ice jams may affect the relation of gage height to discharge during short periods in December, January and February.

REMARKS—The following data have been furnished by the United States Geological Survey:

DISCHARGE TABLE FOR CHEAT RIVER NEAR MORGANTOWN, W. VA., FOR 1912, 1913 AND 1914.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. Ft.	Feet.	Sec. Ft.	Feet.	Sec. Ft.	Feet.	Sec. Ft.	Feet.	Sec. Ft.
1.50	115	.40	1520	.30	8630	.20	18220	.10	27910
.60	140	.50	1730	.40	9040	.30	18730	.20	28420
.70	165	.60	1955	.50	9550	.40	19240	.30	28930
.80	190	.70	2200	.60	10060	.50	19750	.40	29440
.90	220	.80	2450	.70	10570	.60	20260	.50	29950
2.00	255	.90	2710	.80	11080	.70	20770	.60	30460
.10	290	4.00	3000	.90	11590	.80	21280	.70	30970
.20	330	.10	3300	6.00	12100	.90	21790	.80	31480
.30	375	.20	3620	.10	12610	8.00	22300	.90	31990
.40	425	.30	3960	.20	13120	.10	22810	10.00	32500
.50	480	.40	4320	.30	13630	.20	23320	11.00	37600
.60	545	.50	4700	.40	14140	.30	23830	12.00	42700
.70	625	.60	5110	.50	14650	.40	24340	13.00	47800
.80	710	.70	5550	.60	15160	.50	24850	14.00	52900
.90	805	.80	6020	.70	15670	.60	25360	15.00	58000
3.00	915	.90	6500	.80	16180	.70	25870		
.10	1045	5.00	7000	.90	16690	.80	26380		
.20	1185	.10	7510	7.00	17200	.90	26890		
.30	1340	.20	8020	.10	17710	9.00	27400		

Note: This table has been revised above gage height 4.2 and is based on discharge measurements 22 to 25. This table applies to all years 1902-14 with proper change of gage heights 1902-09 by curve of relation as explained in 1910-11 report of Water Supply Commission.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF CHEAT RIVER NEAR MORGANTOWN, W. VA., FOR THE YEAR ENDING SEPTEMBER 30, 1914.

DAY.	OCT.		NOV.		DEC.		JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	2.45	452	3.5	1730	3.45	1620	3.6	1960	6.6	15200	3.7	2200	5.5	9550	....	3340	2.55	512	2.55	512	2.85	758	3.0	915
2,	....	538	3.4	1520	3.4	1520	3.5	1730	5.2	8020	3.55	1840	8.0	22300	3.9	2710	2.45	452	2.5	480	2.7	625	2.8	710
3,	2.7	625	3.25	1260	3.55	1840	3.5	1730	4.6	5110	3.05	980	7.6	20300	....	2280	2.35	400	2.3	375	2.6	545	2.6	545
4,	4.2	3620	3.15	1120	3.5	1730	3.5	1730	4.25	3790	3.4	1520	6.2	13100	3.55	1840	2.35	400	2.3	375	2.5	480	2.5	480
5,	3.65	2080	3.1	1040	3.45	1620	3.4	1520	4.1	3300	3.4	1520	5.3	8530	5.4	9040	2.45	452	....	522	2.4	425	2.4	425
6,	3.3	1340	3.0	915	3.4	1520	3.3	1340	4.0	3000	3.3	1340	4.8	6020	6 8	16200	3.05	980	2.75	668	2.35	400	2.3	375
7,	3.05	980	2.95	860	3.7	2200	3.3	1340	3.95	2860	3.3	1340	4.35	4140	5.7	10600	3.15	1120	2.95	860	2.25	352	2.25	352
8,	2.85	758	2.9	805	6.0	12100	3.3	1340	4.35	4140	3.3	1340	4.3	3960	4.7	5550	2.85	758	2.7	625	2.2	330	2.35	400
9,	2.75	668	3.4	1520	5.0	7000	3.85	2580	4.25	3790	3.3	1340	5.8	11100	4.3	3960	2.6	545	2.6	545	2.15	310	2.25	352
10,	3.6	1960	4.6	5110	4.5	4700	5.7	10600	4.0	3000	3.2	1180	4.9	6500	4.0	3000	2.5	480	2.45	452	2.2	330	2.2	330
11,	4.05	3150	4.25	3790	4.2	3620	5.2	8020	3.9	2710	3.15	1120	4.4	4320	3.8	2450	2.4	425	2.4	425	2.8	710	2.15	310
12,	3.5	1730	4.1	3300	3.95	2860	4.45	4510	3.8	2450	3.45	1620	4.15	3460	3.65	2080	2.35	400	2.3	375	2.85	758	2.15	310
13,	3.45	1620	4.7	5550	3.7	2200	3.9	2710	4.6	5110	3.75	2320	4.0	3000	3.45	1620	2.3	375	2.25	352	3.3	1340	2.1	290
14,	3.3	1340	9.2	28400	3.6	1960	3.75	2320	3.9	2710	3.4	1520	3.85	2580	3.35	1430	2.25	352	2.25	352	3.2	1180	2.1	290
15,	3.15	1120	9.2	28400	....	1840	3.5	1730	3.4	1520	3.85	2580	4.3	3960	3.25	1260	2.2	330	4.15	3460	2.9	805	2.15	310
16,	2.95	860	11.4	39600	3.5	1730	3.5	1730	3.0	915	6.0	12100	7.4	19200	3.2	1180	2.2	330	4.7	5550	2.65	585	2.15	310
17,	2.9	805	8.8	26400	3.5	1730	3.45	1620	2.8	710	7.3	18700	6.7	15700	3.05	980	2.2	330	4.25	3790	2.5	480	2.1	290
18,	2.85	758	6.1	12600	3.5	1730	3.6	1960	2.95	860	6.8	16200	5.5	9550	2.95	860	2.15	310	3.6	1960	2.4	425	2.05	272
19,	2.85	758	5.2	8020	3.5	1730	3.25	1260	5.9	11600	5.5	9550	5.1	7510	2.85	758	2.1	290	3.35	1430	2.3	375	1.98	248
20,	4.2	3620	4.7	5550	3.5	1730	3.5	1730	8.1	22800	4.8	6020	6.1	12600	2.75	668	2.1	290	3.2	1180	2.2	330	....	239
21,	5.4	9040	4.3	3960	3.4	1520	7.9	21800	5.9	11600	4.15	3460	6.7	15700	2.75	668	2.1	290	2.9	805	2.15	310	1.98	230
22,	4.8	6020	4.0	3000	3.45	1620	6.4	14100	4.9	6500	4.05	3150	5.4	9040	2.65	585	2.15	310	2.7	625	2.1	290	1.96	241
23,	4.2	3620	3.75	2320	3.45	1620	5.2	8020	4.6	5110	3.85	2580	4.5	4700	2.65	585	2.35	400	2.55	512	2.1	290	2.0	255
24,	4.05	3150	3.7	2200	3.95	2860	4.8	6020	4.2	3620	3.75	2320	4.3	3960	2.8	545	3.0	915	2.5	480	2.05	272	1.98	248
25,	6.5	14600	3.55	1840	4.0	3000	5.9	11600	4.1	3300	4.15	3460	4.1	3300	2.55	512	3.35	1430	2.45	452	3.1	1040	1.96	241
26,	6.0	12100	3.45	1620	5.5	9550	5.6	10100	3.9	2710	6.0	12100	7.0	17200	2.55	512	3.6	1960	2.35	400	2.95	860	1.92	227
27,	5.2	8020	3.4	1520	4.9	6500	5.0	7000	3.85	2580	7.2	18200	7.1	17700	2.55	512	3.45	1620	2.9	805	....	1020	1.92	227
28,	4.6	5110	3.4	1520	4.3	3960	4.8	6020	3.85	2580	6.9	16700	5.6	10100	2.55	512	3.05	980	3.75	2320	3.2	1180	2.0	255
29,	4.15	3460	3.4	1520	4.0	3000	5.2	8020	....	.....	7.2	18200	4.8	6020	2.45	452	2.85	758	4.35	4140	3.4	1520	1.95	238
30,	3.85	2580	3.5	1730	3.85	2580	5.3	8530	....	.....	6.0	12100	4.3	3960	2.4	425	2.7	625	3.5	1730	3.35	1430	1.94	234
31,	3.7	2200	....	.....	3.7	2200	5.3	8530	....	.....	5.8	11100	....	.....	2.45	452	....	.....	3.1	1040	3.2	1130	....	.....

Discharge for days of missing gage heights are interpolated.

ESTIMATED MONTHLY DISCHARGE OF CHEAT RIVER NEAR MORGANTOWN, W. VA.

(Drainage area 1,380 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1913.					
October,	14600	452	3180	2.30	2.65
November,	39600	805	6620	4.80	5.36
December,	12100	1520	3080	2.23	2.57
1914.					
January,	21800	1260	5260	3.81	4.39
February,	22800	710	5060	3.67	3.82
March,	15700	980	6120	4.43	5.11
April,	22300	2580	9300	6.74	7.52
May,	16200	425	2500	1.81	2.09
June,	1960	290	627	.454	.51
July,	5550	352	1210	.877	1.01
August,	1520	272	675	.489	.56
September,	915	227	338	.245	.27
The year,	39600	227	3650	2.64	35.86

DUNKARD CREEK.

DESCRIPTION OF BASIN.

Dunkard Creek, a tributary of the Monongahela River in Monongahela County, West Virginia, and Greene County, Pennsylvania, drains an area of approximately 235 square miles, of which 125 square miles lie in Pennsylvania. Rising in two forks, Pennsylvania and West Virginia forks, the former heading in the south central part of Greene County, and the latter in the western part of Monongahela County, W. Virginia, which join on the Pennsylvania-West Virginia line, the stream follows a general easterly direction through a rolling, well settled, farming country, practically deforested, with many turns, crossing and recrossing the state line to its mouth, three miles below Point Marion, Pennsylvania. The distance from the forks to the mouth is about 36 miles.

The West Virginia Fork rises at an elevation of about 1300 feet, and the Pennsylvania Fork at an elevation of about 1400 feet. The junction lies at an elevation of 975 feet, and the mouth at an elevation of 800 feet. The forks have an approximate slope of 30 feet per mile, but from the junction to the mouth it is only 5 feet per mile. The principal tributaries are Pennsylvania and West Virginia forks. There are only a few small villages and one borough in this basin, none of which use the water of this stream for domestic supply. This creek in the fall of 1908 was absolutely dry at a point a short distance above its mouth.

The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge has been measured since October 14, 1909, at "Bobtown," about two miles above the mouth.

OHIO BASIN—STATION NO. 23.

DUNKARD CREEK AT "BOBTOWN," PA.

DESCRIPTION OF STATION.

LOCATION—On single span, covered wooden bridge, about 2 miles above the mouth of the creek.

RECORDS AVAILABLE—Discharge measurements and gage heights from October 14, 1909, to September 30, 1914.

DRAINAGE AREA—230 square miles.

GAGE—A 12 foot staff gage is bolted to the downstream wing of the left abutment. The elevation of zero is arbitrary. Bench Mark No. 1 is shelf on top of second course from bottom, third stone in from face, left abutment, elevation 2.64 feet above gage datum. The gage is read twice daily by Mrs. Enlow Stoneking.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge during floods, and by wading during low stages. The initial point for soundings is top edge of bridge seat, left abutment.

CHANNEL—The channel is straight above and below the station. Both banks are high and do not overflow. The bed is rocky. There is a deep quiet pool under the bridge, with very sluggish flow at low stages.

DISCHARGE MEASUREMENTS OF DUNKARD CREEK AT "BOBTOWN," GREENE COUNTY, PA.

(Drainage area 230 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
5	July 8	Wilson & Taylor, ...	29	16	0.25	0.78	4	Wading msmt. 300 ft. below bridge.

DAILY MEAN GAGE HEIGHTS OF DUNKARD CREEK AT "BOBTOWN," GREENE COUNTY, PA.

1914. DAY.	JAN. G. H.	FEB. G. H.	MARCH. G. H.	APRIL. G. H.	MAY. G. H.	JUNE. G. H.	JULY. G. H.	AUG. G. H.	SEPT. G. H.
1,	2.00	3.80	3.28	2.70	2.10	1.41	0.94	0.96	0.84
2,	1.50	2.95	2.84	4.45	1.96	1.40	0.95	0.93	0.83
3,	1.90	2.62	2.66	4.62	1.82	1.36	0.94	0.95	0.85
4,	1.90	2.43	2.62	3.42	1.73	1.38	0.94	0.82	0.84
5,	2.02	2.16	2.52	3.00	1.72	3.31	0.93	0.78	0.83
6,	2.08	2.22	2.68	2.58	2.23	2.15	0.93	0.76	0.79
7,	2.17	2.52	3.39	2.52	2.12	1.67	0.92	0.72	1.06
8,	2.26	2.72	3.52	2.46	1.92	1.43	0.90	0.70	0.96
9,	4.00	2.52	2.94	3.65	1.90	1.42	0.88	0.66	0.92
10,	†5.15	2.22	2.69	2.99	1.84	1.38	0.86	0.68	0.90
11,	2.80	2.12	2.82	2.54	1.77	1.34	0.85	0.80	1.22
12,	2.83	*2.15	2.79	2.40	1.66	1.30	0.84	1.06	1.04
13,	2.46	1.82	2.56	2.28	2.35	1.28	0.83	1.32	0.94
14,	2.34	1.92	2.60	2.20	2.61	1.24	0.83	1.48	0.86
15,	2.36	2.25	3.92	2.56	2.45	1.23	0.85	1.28	0.81
16,	2.38	2.50	4.10	§5.25	2.19	1.20	0.84	1.16	0.77
17,	2.43	1.88	3.72	3.40	1.79	1.16	0.82	1.02	0.74
18,	2.42	2.18	3.49	2.78	1.64	1.12	0.81	0.99	0.73
19,	2.41	‡5.18	2.98	2.65	1.52	1.00	0.80	0.93	0.70
20,	3.12	4.72	2.68	3.18	1.42	1.00	0.78	0.86	0.70
21,	4.20	3.18	2.46	3.42	1.36	0.88	0.77	0.82	0.68
22,	3.20	2.78	2.26	2.82	1.30	0.82	0.76	0.79	0.66
23,	2.60	2.62	2.12	2.49	1.27	0.81	0.76	0.74	0.63
24,	2.50	2.60	1.95	2.36	1.26	0.91	0.76	0.70	0.64
25,	4.00	*2.75	1.82	2.22	1.22	0.96	0.84	0.72	0.68
26,	3.30	2.60	1.72	4.00	1.21	1.02	0.83	0.72	0.66
27,	2.89	2.60	1.62	3.42	1.22	1.02	0.98	0.70	0.64
28,	2.66	2.68	1.76	2.66	1.74	1.00	1.58	0.71	0.62
29,	2.48	.....	3.24	2.42	1.61	0.96	1.39	0.82	0.61
30,	2.42	.....	2.77	2.24	1.50	0.94	1.31	0.86	0.60
31,	2.49	.....	2.64	.....	1.42	.....	1.05	0.85	.....

*Creek frozen Feb. 12-18 inclusive; Feb. 25-March 1 at 9.30 a. m., inclusive. †Max. 5.8 at 8 a. m. ‡Max. 7.1 at 5 p. m. §Max. 6.2 at 8 a. m.

YOUGHIOGHENY RIVER.

DESCRIPTION OF BASIN.

The Youghiogheny River, the largest tributary of the Monongahela River, drains an area of approximately 1800 square miles in Maryland, West Virginia and Pennsylvania, of which about 1265 square miles lie in Pennsylvania. Rising near the Maryland-West Virginia boundary line, in Preston County, West Virginia, to the north of the headwaters of the Potomac River, and upon the western side of Great Savage Mountain, its course is almost due north, roughly paralleling the Monongahela River, between Negro Mountain, on the east, and Briary Mountain, on the west, it crosses the state line near Watsondale, at the junction of Fayette and Somerset counties.

On the upper reaches of this river the grade is steep, but the valley is open and rolling. It soon becomes more mountainous, however, and the stream flows between high, steep hills, ending abruptly at the water's edge, the channel being strewn with numerous boulders and large stones. The river continues northward in this manner, gradually loosing its swiftness, but still retaining the hilly nature, to Somerfield, Pa., two miles above the state line, where the slope of the stream is more uniform and continues as such to its junction with the Casselman River. From Confluence, where it is joined by its largest tributary, Casselman River, to its mouth the river follows a general northwesterly direction, the valley being narrow and steep, and to Bidewell the stream flows at a fairly uniform grade, gradually developing into rapids with the valley assuming a more gorge-like form. Just above Ohiopyle the stream becomes very rapid, assuming its greatest fall as it makes a long loop around the mountain. Between Connellsville and West Newton the stream cuts through a succession of ridges, alternating with rolling country on either side, and from this point to its mouth the valley is wide and rolling.

The total length of this river is about 125 miles, of which approximately 83 miles lie in Pennsylvania. The elevation of the source is approximately 3000 feet, and at the point where the Youghiogheny enters Pennsylvania the elevation is 1400 feet, giving a slope of about 38 feet per mile in this distance. From the state line to Connellsville the fall is at the rate of approximately 17 feet per mile, and from Connellsville to the mouth, 43 miles, the rate is 3.5 feet per mile. Between Ohiopyle and Connellsville, a distance of 17.5 miles, the rate of fall is 19 feet per mile, reaching at Ohiopyle Falls a rate of over 50 feet per mile.

The principal tributaries of the Youghiogheny River in Pennsylvania are Big Sewickley Creek, Indian Creek and the Casselman River. There are many tributaries in Maryland and West Virginia, the principal being Bear Creek, Deep Creek, Little Youghiogheny and Rhine creeks.

The headwaters of this stream and the basin of it as far down as Connellsville is sparsely inhabited well covered with second growth timber, with some farming and coal mining carried on. From Connellsville to the mouth the watershed is densely inhabited, especially in the valleys, which are industrially very active, the surrounding hills being practically deforested, while considerable farming is carried on. The region is the center of the vast bituminous coal producing and coke making belt and the streams are laden with mine water and sulphur. Four large boroughs and many large villages lie in this area, some of the communities obtaining a domestic water supply from the stream.

Navigation on the Youghiogheny River was at one time improved by the construction of dams and locks, from McKeesport, at its mouth, to West Newton, 19 miles above. Since 1868, however, this navigation has been abandoned, and all dams and locks removed from the river.

The mean annual precipitation over the lower portion of this watershed is from 35 to 40 inches, the central portion from 45 to 50 inches, while the upper portion is subject to a rainfall of from 40 to 45 inches.

The discharge has been measured at Friendsville, Md., Confluence, Pa., and at Connellsville, Pa., since August 17, 1898, September 15, 1904, and July 22, 1908, respectively, the former, however, being discontinued on December 31, 1904.

OHIO BASIN—STATION NO. 24.

YOUGHIOGHENY RIVER AT CONFLUENCE, PA.

DESCRIPTION OF STATION.

LOCATION—At the highway bridge about one-half mile from the railroad station at Confluence, Somerset County.

RECORDS AVAILABLE—Discharge complete from September 15, 1904, to September 30, 1914.

DRAINAGE AREA—435 square miles.

GAGE—A standard chain gage is fastened to the downstream handrail of the bridge. The length of chain from the center of rivet to the bottom of the weight is 25.17 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is a cross on head of rivet in bedplate at right abutment on downstream side, elevation 20.53 feet above gage datum. Bench Mark No. 2 is a cross on lower chord of bridge under gage box, elevation 20.28 feet above gage datum. The gage is read once daily by Lloyd L. Mountain.

DISCHARGE MEASUREMENTS—Taken from the upstream side of the bridge. The initial point for soundings is center of bridge pin over right abutment on upstream side of bridge.

CHANNEL—The channel is straight above and below the station for 200 feet and 500 feet respectively. The right bank is high and does not overflow. The left bank is low, clean, and overflows during high water. The bed is rocky, and there is a small cobblestone dam 4 to 6 inches high under bridge.

DISCHARGE MEASUREMENTS OF YOUGHIOGHENY RIVER AT CONFLUENCE, SOMERSET COUNTY, PA.

(Drainage area 435 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
23	July 7	Wilson & Taylor, ...	189	164	0.92	1 90	150	Wading msmt. at bridge
24	Sept. 22	Bowen & Brady, ...	174	94	0.63	1.55	59	Surf. msmt.

DISCHARGE TABLE FOR YOUGHIOGHENY RIVER AT CONFLUENCE, SOMERSET COUNTY, FROM JAN. 1, 1913.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1.10	10	.20	2070	.30	6370	.40	10710	.50	15050
.20	15	.30	2190	.40	6510	.50	10850	.60	15190
.30	25	.40	2320	.50	6650	.60	10990	.70	15330
.40	40	.50	2450	.60	6790	.70	11130	.80	15470
.50	55	.60	2590	.70	6930	.80	11270	.90	15610
.60	75	.70	2730	.80	7070	.90	11410	14.00	15750
.70	95	.80	2870	.90	7210	11.00	11550	.10	15890
.80	120	.90	3010	8.00	7350	.10	11690	.20	16030
.90	150	5.00	3150	.10	7490	.20	11830	.30	16170
2.00	180	.10	3290	.20	7630	.30	11970	.40	16310
.10	220	.20	3430	.30	7770	.40	12110	.50	16450
.20	270	.30	3570	.40	7910	.50	12250	.60	16590
.30	320	.40	3710	.50	8050	.60	12390	.70	16730
.40	380	.50	3850	.60	8190	.70	12530	.80	16870
.50	450	.60	3990	.70	8330	.80	12670	.90	17010
.60	520	.70	4130	.80	8470	.90	12810	15.00	17150
.70	590	.80	4270	.90	8610	12.00	12950	.10	17290
.80	670	.90	4410	9.00	8750	.10	13090	.20	17430
.90	750	6.00	4550	.10	8890	.20	13230	.30	17570
3.00	840	.10	4690	.20	9030	.30	13370	.40	17710
.10	930	.20	4830	.30	9170	.40	13510	.50	17850
.20	1020	.30	4970	.40	9310	.50	13650	.60	17990
.30	1110	.40	5110	.50	9450	.60	13790	.70	18130
.40	1210	.50	5250	.60	9590	.70	13930	.80	18270
.50	1310	.60	5390	.70	9730	.80	14070	.90	18410
.60	1410	.70	5530	.80	9870	.90	14210		
.70	1510	.80	5670	.90	10010	13.00	14350		
.80	1610	.90	5810	10.00	10150	.10	14490		
.90	1720	7.00	5950	.10	10290	.20	14630		
4.00	1830	.10	6090	.20	10430	.30	14770		
.10	1950	.20	6230	.30	10570	.40	14910		

Note: Curve below 6.0 feet was changed on account of 2 measurements made in 1912-13; above 6.0 feet it is coincident with that formerly used.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF YOUGHIOGHENY RIVER AT CONFLUENCE, SOMERSET COUNTY, PA.

1914.	JAN.		FEB..		MARCH.		APRIL.		MAY.		JUNE		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	2.88	734	4.98	3120	2.93	777	8.29	7760	3.24	1060	1.99	177	2.59	513	1.82	126	2.09	216
2,	2.73	614	4.88	2980	2.73	614	6.99	5940	2.99	831	1.94	162	2.39	374	1.72	100	2.04	196
3,	2.13	614	4.58	2560	2.98	822	6.29	4960	2.84	702	1.89	147	2.29	315	1.72	100	1.99	177
4,	2.88	734	3.98	1810	3.18	1000	5.59	3980	2.69	583	2.94	786	2.19	265	1.67	89	1.89	147
5,	2.78	654	3.33	1140	3.08	912	4.79	2860	3.94	1760	2.59	513	2.09	216	1.62	79	1.84	132
6,	2.68	576	3.13	957	2.98	822	4.24	2120	5.89	3700	2.39	374	1.99	177	1.57	69	1.74	105
7,	2.58	506	3.23	1050	2.88	734	3.99	1820	4.39	2310	2.24	290	1.92	156	1.57	69	1.74	105
8,	2.48	436	3.13	957	2.83	694	3.84	1650	3.99	1820	2.09	216	1.90	150	1.52	59	1.69	93
9,	2.98	822	2.88	734	2.78	654	3.94	1760	3.64	1450	1.99	177	1.85	135	1.52	59	1.69	93
10,	4.78	2840	2.98	822	2.68	576	3.54	1350	3.34	1150	1.99	177	1.85	135	1.97	171	1.64	83
11,	4.08	1930	2.88	734	2.58	506	3.29	1100	3.14	966	1.94	162	1.80	120	1.92	156	1.64	83
12,	3.08	912	2.58	506	2.88	734	3.09	921	2.89	742	1.89	147	1.80	120	2.12	230	1.74	105
13,	3.23	1050	2.38	368	2.88	734	2.99	831	2.99	831	1.89	147	1.80	120	2.82	686	1.69	93
14,	3.08	912	2.28	310	2.78	654	2.99	831	2.79	662	1.84	132	1.80	120	2.32	332	1.69	93
15,	2.98	822	2.58	506	2.73	614	2.94	786	2.69	583	1.79	118	2.35	350	2.12	230	1.64	83
16,	2.88	734	2.58	506	5.43	3750	6.29	4960	2.59	513	1.74	105	2.50	450	1.87	141	1.64	83
17,	2.78	654	2.48	436	7.23	6270	5.89	4400	2.49	443	1.69	93	2.25	295	1.72	100	1.59	73
18,	2.68	576	2.73	614	6.83	5710	4.49	2440	2.44	408	1.69	93	2.00	180	1.67	89	1.59	73
19,	2.88	734	5.48	3820	5.13	3330	3.99	1820	2.39	374	1.64	83	1.95	165	1.62	79	1.54	63
20,	3.13	957	5.88	4380	4.28	2170	4.19	2060	2.34	344	1.64	83	1.85	135	1.62	79	1.54	63
21,	6.78	5640	4.78	2840	3.88	1700	5.69	4120	2.29	315	1.59	73	1.80	120	1.57	69	1.49	54
22,	5.18	3400	3.88	1700	3.48	1290	4.49	2440	2.24	290	1.84	132	1.75	108	1.57	69	1.49	54
23,	4.43	2360	3.78	1590	3.28	1090	3.99	1820	2.19	265	1.99	177	1.70	95	1.57	69	1.44	46
24,	4.18	2050	3.13	957	3.18	1000	2.99	831	2.14	240	2.54	478	1.70	95	1.57	69	1.44	46
25,	4.83	2910	3.28	1090	3.68	1490	2.94	786	2.09	216	2.04	196	1.70	95	3.52	1330	1.44	46
26,	5.18	3400	3.13	957	6.08	4680	6.49	5240	2.04	196	3.29	1100	1.65	85	3.02	858	1.44	46
27,	4.98	3120	3.03	867	7.08	6060	5.09	3280	2.24	290	2.74	622	1.65	85	2.57	499	1.44	46
28,	5.23	3540	2.98	822	7.58	6760	4.19	2060	2.24	290	6.84	5730	1.60	75	2.27	305	1.44	46
29,	5.23	3470	.....	.....	6.68	5500	3.84	1650	2.14	240	3.04	876	1.60	75	2.17	255	1.44	46
30,	4.98	3120	.....	.....	5.78	4240	3.49	1300	2.09	216	2.79	662	2.15	245	2.27	305	1.39	38
31,	4.88	2980	.....	.....	5.58	3960	.....	.....	2.04	196	.....	.....	1.90	150	2.12	230	.....	.....

ESTIMATED MONTHLY DISCHARGE OF YOUGHIOGHENY RIVER AT CONFLUENCE, SOMERSET COUNTY, PA.

(Drainage area 435 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	5640	436	1740	4.000	4.612
February,	4380	310	1400	3.218	3.351
March,	6760	508	2250	5.172	5.962
April,	7760	786	2600	5.977	6.669
May,	3700	196	774	1.779	2.051
June,	6730	73	474	1.090	1.216
July,	513	75	184	0.423	0.488
August,	1330	59	229	0.526	0.607
September,	216	38	88	0.202	0.225

CASSELMAN RIVER.

DESCRIPTION OF BASIN.

The Casselman River, the largest tributary of the Youghiogheny River, drains an area of approximately 578 square miles, of which 480 lie in Pennsylvania and 98 in Maryland. Rising in two branches, the North and the South, in Garrett County, Maryland, which join in the above county about four miles south of the Mason and Dixon line, the stream flows northeasterly into Pennsylvania at Meyersdale, Somerset County, where it turns northwesterly to Rockwood and thence southwesterly to the Youghiogheny River, at Confluence, Somerset County, Pa. The North and South branches respectively, are 13 and 8 miles long, and the main river, from the junction to its mouth, is 23 miles in length. Its course through Maryland and the southern part of Somerset County, Pa., follows a fertile, rolling valley, between Negro and Meadow mountains, whose average width is about six miles. From Meyersdale to its mouth, the course of the stream becomes more confined, and the valley is steep and grows deeper toward its mouth. This river has a rapid fall throughout practically its entire length. The principal tributary is Laurel Hill Creek, which enters the river just above its confluence with the Youghiogheny River. The valleys are largely under cultivation, while the hillsides and mountain tops are covered with second growth timber.

There are numerous small boroughs and villages in this drainage basin. Bituminous coal is being extensively mined, and with farming, is the principal industry. The drainage basin has been virtually

deforested, but is rapidly being covered with second growth. A few of the tributaries of the Casselman River are used as sources for domestic supply.

The mean annual precipitation over this watershed is between 40 and 45 inches.

The discharge has been measured from September 15, 1904, to August 11, 1913, at Confluence, about one mile above the mouth, and since August 25, 1913, at Markleton, Somerset County.

OHIO BASIN—STATION NO. 25.

CASSELMAN RIVER AT MARKLETON, PA.

DESCRIPTION OF STATION.

LOCATION—On two span, through-truss, highway bridge, at B. & O. Railroad Station, Markleton, Somerset County.

RECORDS AVAILABLE—Discharge measurements and gage heights from August 13, 1913, to December 31, 1913, and June 13, to September 30, 1914.

DRAINAGE AREA—365 square miles.

GAGE—A chain gage is fastened to the downstream handrail. The elevation of zero is arbitrary. The length of chain from the bottom of the weight to the marker is 25.38 feet. Bench Mark No. 1 is the outer downstream corner of right bridge seat, elevation 20.25 feet above gage datum. Bench Mark No. 2 is top of 8th course on wingwall, second stone in from face of abutment, about 6 inches from front edge of stone, elevation 13.15 feet above gage datum. The gage is read twice daily by C. O. Burns.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is center of bridge pin, right abutment, downstream side.

CHANNEL—The channel is straight above and below the station for 1,200 feet and 1,500 feet respectively. Both banks are high and do not overflow. The bed is composed of gravel and boulders.

DISCHARGE MEASUREMENTS OF CASSELMAN RIVER AT MARKLETON, SOMERSET COUNTY, PA.

(Drainage area 365 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
2	July 6	Wilson & Taylor, ...	154	329	0.84	2.90	277	0.6 msmt.
3	Sept. 21	Bowen & Brady, ...	134	170	0.08	1.82	13	Surf & 0.6 msmt.

DAILY MEAN GAGE HEIGHTS OF CASSELMAN RIVER AT MARKLETON, SOMERSET COUNTY, PA.

1914. DAY.	JUNE. G. H.	JULY. G. H.	AUG. G. H	SEPT. G. H.
1,	.....	3.32	2.10	2.05
2,	.....	3.30	2.10	2.02
3,	.....	3.08	2.10	1.97
4,	.....	2.95	2.08	1.97
5,	.....	3.00	2.08	1.97
6,	.....	2.92	2.07	1.97
7,	.....	2.85	2.06	2.17
8,	.....	2.68	2.06	2.12
9,	.....	2.60	2.05	2.12
10,	.....	2.48	2.05	2.04
11,	.....	2.45	2.50	1.97
12,	.....	2.48	2.72	1.92
13,	2.30	2.52	2.75	1.97
14,	2.30	2.53	2.58	1.97
15,	2.20	2.68	2.28	1.94
16,	2.20	2.90	2.19	1.92
17,	2.20	2.85	2.12	1.87
18,	2.15	2.60	2.05	1.87
19,	2.15	2.48	2.05	1.85
20,	2.15	2.42	2.02	1.82
21,	2.15	2.35	2.00	1.80
22,	2.20	2.22	1.95	1.82
23,	2.95	2.20	1.91	1.82
24,	3.02	2.20	1.10	1.82
25,	3.05	2.20	1.95	1.82
26,	4.65	2.20	3.15	1.79
27,	4.40	2.20	2.45	1.77
28,	7.70	2.20	2.20	1.72
29,	4.50	2.16	2.10	1.72
30,	3.65	2.15	2.10	1.72
31,	.....	2.13	2.05	.....

Gage heights reported by observer previous to June 12, considered unreliable, and therefore are not published.

LAUREL HILL CREEK.

DESCRIPTION OF BASIN.

Laurel Hill Creek, in Somerset and Fayette counties, the principal tributary of the Casselman River, drains an area of approximately 125 square miles. Rising in the southeastern corner of Jefferson Township, Somerset County, this stream flows northward a short distance, and then, describing a semi-circle, turns southward, through a hilly farming country, almost deforested and underlain with bituminous coal, to its mouth at Confluence, a distance of about 30 miles. There are many tributaries to this stream, none of which, however, drain an area of more than seven or eight square miles, the watershed being an approximate parallellogram seven miles in width and about 17 miles in length. One borough and numerous farming villages are located on this basin. A few private water supplies are obtained from this watershed.

The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge has been measured from September 15, 1904, to August 11, 1913, at Confluence, near its mouth, and since August 12, 1913, at Ursina, about 3 miles above the mouth.

OHIO BASIN—STATION NO. 26.

LAUREL HILL CREEK AT URSINA, PA.

DESCRIPTION OF STATION.

LOCATION—On two span, through-truss, highway bridge, at Ursina, two miles above Confluence, Somerset County.

RECORDS AVAILABLE—Discharge measurements and gage heights from August 12, 1913, to September 30, 1914.

DRAINAGE AREA—122 square miles.

GAGE—A standard chain gage is fastened on the upstream handrail. The length of chain from the bottom of the weight to the marker is 18.65 feet. The elevation of zero is arbitrary. Bench Mark

No. 1 is on top of the fourth stone from the upstream corner of the left abutment in the ninth course down from the top, elevation 5.475 feet above gage datum. The gage is read twice daily by A. J. Case.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge and by wading. The initial point for soundings is face of right abutment.

CHANNEL—The channel is straight above and below the station for 1,500 feet and 1,000 feet respectively. Both banks are high and not subject to overflow. The bed is composed of gravel and stones.

DISCHARGE MEASUREMENTS OF LAUREL HILL CREEK AT URSINA, SOMERSET COUNTY, PA.

(Drainage area 122 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
2	July 7	Wilson & Taylor, ...	138	119	0.71	2.00	85	Wading msmt. at bridge.
3	Sept. 23	Bowen & Brady, ...	107	69	0.12	1.64	8	Wading msmt. at bridge.

DAILY MEAN GAGE HEIGHTS OF LAUREL HILL CREEK AT URSINA, SOMERSET COUNTY, PA.

1914.	JAN.	FEB.	MARCH.	APRIL.	MAY.	JUNE.	JULY.	AUG.	SEPT.
DAY.	G. H.	G. H.	G. H.	G. H.	G. H.	G. H.	G. H.	G. H.	G. H.
1,	2.30	3.68	2.40	3.70	2.65	1.90	2.30	1.78	1.72
2,	2.25	3.15	2.20	4.78	2.50	1.85	2.25	1.86	1.72
3,	2.25	2.90	2.35	4.25	2.40	1.80	2.20	1.88	1.72
4,	2.28	2.75	2.45	3.55	2.32	1.95	2.10	1.88	1.72
5,	2.25	2.65	2.40	3.20	3.10	2.60	2.00	1.88	1.72
6,	2.20	2.60	2.20	2.95	3.25	2.00	2.00	1.78	1.72
7,	2.20	2.50	2.15	2.85	2.95	1.95	2.00	1.78	1.90
8,	2.25	2.45	2.25	2.80	2.80	1.90	2.00	1.78	1.84
9,	2.45	2.35	2.22	2.75	2.65	1.90	2.00	1.78	1.64
10,	2.95	2.45	2.25	2.62	2.60	1.88	2.00	1.98	1.72
11,	2.65	2.30	2.28	2.52	2.50	1.95	1.90	2.00	1.72
12,	2.50	2.20	2.40	2.60	2.40	1.85	1.90	2.33	1.72
13,	2.41	2.20	2.40	2.50	2.50	1.80	1.95	2.20	1.72
14,	2.45	2.85	2.35	2.48	2.40	1.80	1.95	2.08	1.72
15,	2.50	2.75	3.05	2.75	2.35	1.75	2.00	1.98	1.72
16,	2.50	*3.00	4.10	3.30	2.30	1.70	2.00	1.85	1.69
17,	2.40	3.05	4.85	3.20	2.25	1.70	2.10	1.85	1.69
18,	2.35	3.10	4.30	2.95	2.20	1.70	2.20	1.85	1.69
19,	2.30	3.50	3.50	2.95	2.20	1.70	2.00	1.80	1.69
20,	2.55	3.28	3.05	3.15	2.15	1.70	1.90	1.75	1.69
21,	3.55	2.95	2.75	3.12	2.10	1.70	1.90	1.75	1.69
22,	3.05	2.75	2.68	2.95	2.10	1.70	1.90	1.75	1.58
23,	2.90	2.55	2.65	2.75	2.10	1.95	1.90	1.75	1.62
24,	2.75	2.50	2.45	2.60	2.05	2.25	1.90	1.75	1.65
25,	2.90	2.45	2.80	2.55	1.95	2.00	1.90	1.75	1.68
26,	2.75	2.45	3.90	4.65	2.00	2.30	1.90	1.75	1.65
27,	2.70	2.45	4.25	3.70	1.95	2.05	1.90	1.75	1.65
28,	2.90	2.40	4.65	3.18	2.20	5.40	1.90	1.75	1.65
29,	3.55	.....	4.15	2.85	2.00	3.40	1.90	1.75	1.65
30,	3.70	.....	3.80	2.80	2.15	2.60	1.85	1.75	1.60
31,	3.85	.....	4.05	.....	2.00	.....	1.85	1.80	.....

*Creek frozen Feb. 16-19 inclusive.

OHIO BASIN—STATION NO. 27.

YOUGHIOGHENY RIVER AT CONNELLSVILLE, PA.

DESCRIPTION OF STATION.

LOCATION—On two span, steel, through-truss, highway bridge from Connellsville to New Haven.

RECORDS AVAILABLE—Discharge complete from July 22, 1908, to September 30, 1914.

DRAINAGE AREA—1320 square miles.

GAGE—A standard chain gage is bolted to the downstream handrail in the New Haven side. The length of chain from the bottom of the weight to the marker is 34.24 feet. The elevation of zero is 860.131 feet above sea level. Bench Mark No. 1 is chiseled point on projecting stone in retaining wall on New Haven side, below bridge, lowest point on stone. "B. M." chiseled into stone above, elevation 864.656 feet above sea level. Bench Mark No. 2 is U. S. G. S. bronze tablet on upstream end of pier of highway bridge, pier between B. & O. Railroad tracks, elevation 884.686 feet above sea level. The gage is read twice daily by D. H. Flick.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge, during extreme low water by wading at section 600 feet above B. & O. pumping station (on right bank about one mile above bridge). The initial point for soundings in first span is point on downstream handrail directly above face of concrete retaining wall at B. & O. tracks, in second span, bend in handrail over second pier.

CHANNEL—The channel above the station is straight for ½ mile. Below the station it is straight for 600 feet. A railroad bridge crosses the stream 500 feet below the station. Both banks are high and not subject to overflow. The bed is composed of rocks, gravel and mud.

REMARKS—There is a grist mill on left bank above the bridge getting head by means of a loose stone wingwall. Tailrace comes in 100 feet above bridge.

DISCHARGE MEASUREMENTS OF YOUGHIOGHENY RIVER AT CONNELLSVILLE, FAYETTE COUNTY, PA.

(Drainage area 1,320 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
18	June 24,	Ellsworth & Adams,..	234	883	1.12	2.00	1000	0.2, 0.6 & 0.8 msmt.
19	July 8,	Wilson & Taylor, ...	245	810	0.77	1.61	624	0.6 msmt.
20	Sept. 2,	Adams	158	183	1.83	0.97	334	0.2, 0.6 & 0.8 msmt.
21	Sept. 11,	Ellsworth, ...	133	178	0.95	0.71	145	0.2, 0.6 & 0.8 msmt.
22	Sept. 22,	Bowen & Brady, ...	218	508	0.17	0.45	85	0.2 & 0.8 msmt.

DISCHARGE TABLE FOR YOUGHIOGHENY RIVER AT CONNELLSVILLE, FAYETTE COUNTY, FROM JAN. 1, 1914.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
0.00	35	.70	1715	.40	6590	.10	14530	.80	25000
.10	40	.80	1855	.50	6820	.20	14860	.90	25440
.20	50	.90	2000	.60	7050	.30	15200	11.00	25880
.30	60	3.00	2145	.70	7280	.40	15550	.10	26320
.40	75	.10	2305	.80	7520	.50	15920	.20	26760
.50	90	.20	2470	.90	7780	.60	16290	.30	27200
.60	115	.30	2640	6.00	8040	.70	16660	.40	27650
.70	140	.40	2810	.10	8300	.80	17030	.50	28100
.80	180	.50	2980	.20	8580	.90	17400	.60	28550
.90	220	.60	3150	.30	8860	9.00	17770	.70	29000
1.00	270	.70	3325	.40	9150	.10	18140	.80	29470
.10	325	.80	3500	.50	9460	.20	18510	.90	29960
.20	380	.90	3680	.60	9750	.30	18890	12.00	30450
.30	440	4.00	3860	.70	10055	.40	19270	.10	30950
.40	500	.10	4040	.80	10360	.50	19650	.20	31450
.50	570	.20	4220	.90	10665	.60	20040	.30	31950
.60	640	.30	4400	7.00	10970	.70	20440	.40	32450
.70	710	.40	4580	.10	11280	.80	20840	.50	32950
.80	790	.50	4770	.20	11590	.90	21240	.60	33400
.90	870	.60	4960	.30	11910	10.00	21640	.70	34050
2.00	960	.70	5155	.40	12230	.10	22040	.80	34600
.10	1050	.80	5350	.50	12550	.20	22450	.90	35150
.20	1145	.90	5545	.60	12880	.30	22860	13.00	35700
.30	1250	5.00	5740	.70	13210	.40	23270	.10	36250
.40	1360	.10	5950	.80	13540	.50	23690	.20	36850
.50	1470	.20	6160	.90	13870	.60	24120		
.60	1590	.30	6370	8.00	14200	.70	24560		

Note.—This table is only applicable subsequent to Jan. 1, 1914, and is based on 5 discharge measurements made during 1914, together with former curve.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF YOUGHIOGHENY RIVER AT CONNELLSVILLE, FAYETTE CO., PA.

1914. DAY.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis	G H	Dis,	G H	Dis.	G H	Dis.	G H	Dis.
1,	2.70	1720	5.50	6320	2.90	1860	5.97	7960	3.67	3270	1.43	521	2.57	1550	0.90	220	1.19	374
2,	2.38	1340	4.95	5640	2.25	1200	3.70	16700	3.37	2760	1.35	470	2.35	1300	0.90	220	0.99	265
3,	2.45	1420	4.33	4450	1.75	750	3.20	14900	3.03	2190	1.30	440	2.10	1050	0.87	208	0.92	230
4,	2.42	1380	4.00	3860	2.38	1340	7.02	11000	2.80	1860	1.27	422	§1.98	942	0.87	208	0.84	196
5,	2.40	1360	3.70	3320	2.47	1440	5.78	7350	3.32	2670	2.25	1200	§1.86	838	0.84	196	0.79	176
6,	2.38	1340	3.45	2900	2.45	1420	5.07	5890	6.55	9600	2.40	1360	1.73	734	0.77	168	0.74	156
7,	2.30	1250	3.32	2670	2.42	1380	4.60	4960	5.30	6370	2.00	960	1.57	619	0.74	156	0.82	188
8,	2.30	1250	3.15	2390	2.37	1330	4.25	4310	4.63	5020	1.53	591	1.56	612	0.80	115	0.76	164
9,	3.13	2440	2.98	2120	2.25	1200	4.38	4540	4.17	4170	1.33	458	1.40	500	0.42	78	0.96	250
10,	5.02	5780	2.70	1720	2.10	1050	3.95	3770	3.80	3500	1.32	452	1.35	470	0.62	120	0.94	240
11,	4.75	5250	2.75	1780	2.25	1300	3.57	3100	3.37	2760	1.50	570	1.25	410	1.30	440	0.79	176
12,	3.78	3460	2.42	1380	2.08	1030	3.68	3290	3.13	2350	1.33	458	1.20	380	1.57	619	0.69	138
13,	2.98	2120	2.15	1100	2.13	1080	3.47	2930	3.10	2300	1.23	398	1.18	369	1.64	668	0.64	125
14,	2.74	1770	1.85	830	2.25	1200	3.20	2470	2.90	2000	1.13	342	1.30	440	1.60	640	0.64	125
15,	3.18	2440	1.70	710	3.85	3590	3.40	2810	2.72	1740	1.08	314	1.38	488	1.50	570	0.74	156
16,	3.15	2390	2.12	1070	6.77	10300	6.10	8300	2.50	1470	0.95	245	1.92	888	1.22	392	0.78	164
17,	2.95	2070	2.08	1030	†8.78	17000	5.88	7730	2.35	1300	0.93	235	1.78	774	0.97	255	0.69	138
18,	2.82	1880	2.15	1100	8.60	16300	5.03	5800	2.17	1120	0.87	208	1.62	654	0.84	196	0.69	138
19,	2.60	1590	4.80	5350	7.00	11000	4.85	5450	2.07	1020	0.85	200	1.35	470	0.77	168	0.49	88
20,	2.80	1860	6.65	9900	5.25	6260	5.13	6010	2.00	960	0.90	220	1.18	369	0.74	156	0.34	66
21,	*6.80	10400	5.32	6410	4.30	4400	6.13	8380	1.87	846	0.85	200	1.02	281	0.67	132	0.46	84
22,	6.32	8920	4.42	4620	4.10	4040	5.25	6260	1.85	830	0.93	235	0.98	260	0.64	125	0.46	84
23,	5.05	5840	4.10	4040	3.70	3320	4.55	4860	1.77	766	1.23	398	0.88	212	0.62	120	0.45	82
24,	4.90	5540	3.50	2980	3.42	2840	4.02	3900	1.67	689	1.83	814	0.82	188	0.62	120	0.48	87
25,	5.32	6410	3.25	2560	3.83	3550	4.33	4450	1.68	696	1.80	790	0.82	188	0.57	108	0.44	81
26,	5.08	5910	3.25	2560	6.67	9960	8.03	14300	1.53	591	4.03	3910	0.82	188	1.84	822	0.44	81
27,	4.59	4940	2.98	2120	8.12	14600	6.75	10200	1.50	570	2.87	1960	0.82	188	1.94	906	0.36	69
28,	4.82	5390	2.85	1930	8.15	14700	5.30	6370	1.85	830	‡6.70	10100	0.82	188	1.53	584	0.44	81
29,	6.35	9000	.....	.....	7.90	13900	4.68	5120	1.77	766	5.00	6740	0.98	260	1.32	452	0.40	75
30,	6.06	8200	....	.....	6.47	9860	4.10	4040	1.68	696	3.38	2780	1.40	500	1.24	404	0.36	69
31,	5.77	7450	.....	.....	6.98	10600	.....	.....	1.53	591	.....	.....	1.08	314	1.32	452	.....	.....

*Max. 7.48 at 4.45 p. m.=12500 sec. ft. †Max. 9.07 at 7.45 a. m.=18000 sec. ft. ‡Max. 8.85 at 4.45 p. m.=17200 sec. ft. §Interpolated.

ESTIMATED MONTHLY DISCHARGE OF YOUGHIOGHENY RIVER AT CONNELLSVILLE, FAYETTE COUNTY, PA.

(Drainage area 1,320 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	12500	1250	3940	2.985	3.442
February,	9900	710	3120	2.364	2.462
March,	18000	750	5600	4.242	4.890
April,	16700	2470	6570	4.977	5.553
May,	9600	570	2140	1.621	1.869
June,	17200	200	1220	0.932	1.040
July,	1550	188	536	0.406	0.468
August,	906	78	323	0.245	0.282
September,	374	66	145	0.110	0.123

TURTLE CREEK.

DESCRIPTION OF BASIN.

Turtle Creek, a tributary of the Monongahela River in Allegheny and Westmoreland counties, drains an area of approximately 145 square miles. Rising in the western part of Westmoreland County, it flows in a southwesterly direction along the Allegheny County line where it is joined by its largest tributary, Brush Creek, and thence through Allegheny County to its mouth, just above Braddock Borough, a total distance of about 20 miles. The basin is fan-shaped and the area drained is a rolling, agricultural country, only seven per cent. being forested, the upper section being entirely devoted to farming, whereas the lower section, along the valley, is congested by railroads and industrial establishments. The entire watershed is densely inhabited, many large and prosperous boroughs lying along the stream. This stream rises at an elevation of approximately 756 feet, making the average slope about 25 feet per mile, but there are numerous stretches of this stream which are flat, showing only a slope of from 5 to 9 feet per mile. In the lower section the channel is filled to a considerable depth with silt. Only one borough receives a domestic water supply from a tributary of Turtle Creek, although many manufacturing establishments use the water for industrial purposes.

The mean annual precipitation over this watershed is from 35 to 40 inches.

The discharge has been measured since December 1, 1907, at East Pittsburgh, about 1½ miles above the mouth and since July 28, 1914, above Trafford City. Its principal tributary, Brush Creek, has been measured since July 28, 1914, above Trafford City, near its mouth.

OHIO BASIN—STATION NO. 28.

TURTLE CREEK ABOVE TRAFFORD CITY, PA.

DESCRIPTION OF STATION.

LOCATION—On highway bridge, east of Linde Air Products Company's factory, Blackburn Station.

RECORDS AVAILABLE—Discharge measurements and gage heights from July 28, 1914, to September 30, 1914.

DRAINAGE AREA—55 square miles.

GAGE—A standard chain gage is fastened to the downstream side of the bridge. The length of chain from the bottom of the weight to the marker is 17.62 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is on top of projecting stone in left downstream wingwall, 8.1 feet in from angle of wingwall with abutment and 8.2 feet from top of wall, elevation 7.91 feet above gage datum. The gage is read twice daily by Frank L. Ganz.

DISCHARGE MEASUREMENTS—Taken from the downstream side of bridge; low water measurements taken about 200 feet above bridge. The initial point for soundings is point on downstream end of bridge directly above top edge of coping of left abutment.

CHANNEL—The channel is straight above and below the station for 250 feet and 200 feet respectively. Both banks are high and do not overflow. The bed is composed of gravel and hardpan.

REMARKS—A railroad bridge crosses the creek about 200 feet downstream.

DISCHARGE MEASUREMENTS OF TURTLE CREEK ABOVE TRAFFORD CITY, WESTMORELAND COUNTY, PA.

(Drainage area 55 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
1	1914 Sept. 25,	Bowen & Brady, ...	19	9.2	0.37	0.73	3	Wading 400′ above gage.

DAILY MEAN GAGE HEIGHTS OF TURTLE CREEK ABOVE TRAFFORD CITY, WESTMORELAND COUNTY, PA.

1914. DAY.	JULY. G. H.	AUG. G. H.	SEPT. G. H.
1,	.....	0.60	0.60
2,	.....	.61	.60
3,	.....	.64	.58
4,	.....	.59	.60
5,	.....	.61	.61
6,	.....	.59	.60
7,	.....	.61	.61
8,	.....	.64	.60
9,	.....	.65	.60
10,	.....	.69	.60
11,	.....	.69	.59
12,	.....	.71	.59
13,	.....	.71	.60
14,	.....	.69	.60
15,	.....	.69	.61
16,	.....	.71	.60
17,	.....	*.66	.60
18,	.....	*.66	.60
19,	.....	*.62	.59
20,	.....	.61	.60
21,	.....	.69	.60
22,	.....	.69	.60
23,	.....	.71	.60
24,	.....	.62	.61
25,	.....	.61	.66
26,	.....	.59	.62
27,	.....	.61	.63
28,	0.67	.62	.61
29,	.61	.64	.61
30,	.62	.64	.60
31,	.61	.59	.....

*Interpolated.

BRUSH CREEK.

DESCRIPTION OF BASIN.

Brush Creek, with a total drainage area of 57 square miles, rises in the central part of Westmoreland County at an elevation of 1300 feet and flows in a southwesterly direction to its mouth at an elevation of 770 feet in Turtle Creek at Trafford City.

It is 20 miles long, with a pear shaped basin, and is the largest tributary of Turtle Creek. From near its source to Jeannette, the slope is 50 feet per mile, and then for 15 miles to its mouth, its slope is 15 feet per mile. It drains a broken and hilly country, almost entirely deforested, while the main valley is wide and contains many flats, bordered by gently sloping hills. The main stream is polluted by wastes from coal mines, although Tinker Run, a tributary, is used for water supply at Irwin and North Irwin.

The main valley is densely populated and contains Jeannette, Westmoreland City, Irwin, North Irwin, Larimer and Trafford City. In addition to various industrial plants, there are extensive soft coal mines and coke ovens scattered through the basin.

The mean annual precipitation over this watershed is from 35 to 40 inches.

The discharge has been measured since July 14, 1914, about one mile above the mouth at Trafford City.

OHIO BASIN—STATION NO. 29.

BRUSH CREEK NEAR TRAFFORD CITY, PA.

DESCRIPTION OF STATION.

LOCATION—On county bridge between Cavettsville and Trafford, Westmoreland County.

RECORDS AVAILABLE—Discharge measurements and gage heights from July 14, 1914, to September 30, 1914.

DRAINAGE AREA—56 square miles.

GAGE—A standard chain gage is fastened to the outside of the downstream under-rail. The length of chain from the bottom of the weight to the marker is 13.76 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is on top of stone at end of left downstream wingwall and is a projection 0.3 feet from downstream end at creek side of stone, painted B. M., elevation 10.085 feet above gage datum. The gage is read twice daily by Paul Stoy.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is left abutment, downstream side.

CHANNEL—The channel above the station curves gently with a riffle about 50 feet above. Below the station it is straight for 250 feet, with a riffle 200 feet below. Both banks overflow at a gage height of approximately 8 feet. The bed is composed of gravel and hardpan.

DISCHARGE MEASUREMENTS OF BRUSH CREEK NEAR TRAFFORD CITY, WESTMORELAND COUNTY, PA.

(Drainage area 56 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
1	1914 Sept. 25,	Bowen & Brady, ...	46	32	0.38	1.88	12	0.6 mamt.

DAILY MEAN GAGE HEIGHTS OF BRUSH CREEK NEAR TRAFFORD CITY, WESTMORELAND COUNTY, PA.

1914. DAY.	JULY. G. H.	AUG. G. H.	SEPT. G. H.
1,	.....	1.85	2.02
2,	.....	1.86	2.08
3,	.....	1.87	2.30
4,	.....	1.88	2.00
5,	.....	1.87	1.97
6,	.....	1.85	1.96
7,	.....	1.84	1.92
8,	.....	1.86	1.87
9,	.....	2.28	1.88
10,	.....	2.60	1.88
11,	.....	2.98	1.89
12,	.....	2.28	1.86
13,	.....	1.90	1.86
14,	1.99	1.85	1.85
15,	2.14	1.87	1.86
16,	2.00	1.86	1.88
17,	1.98	1.86	1.85
18,	1.96	1.85	1.86
19,	1.95	1.89	1.84
20,	1.94	1.88	1.85
21,	1.96	2.16	1.87
22,	1.92	1.98	1.86
23,	1.90	1.88	1.85
24,	2.00	1.95	1.96
25,	2.00	1.90	1.89
26,	1.94	1.89	1.86
27,	1.90	1.88	1.84
28,	1.90	1.92	1.88
29,	1.88	2.41	1.82
30,	1.86	2.26	1.88
31,	1.88	2.04	.....

OHIO BASIN—STATION NO. 30.

TURTLE CREEK AT EAST PITTSBURGH, PA.

DESCRIPTION OF STATION.

LOCATION—On Cable Ave. Viaduct from P. R. R. Depot to Westinghouse Works, East Pittsburgh, Pa.

RECORDS AVAILABLE—Discharge complete from December 1, 1907, to September 30, 1914.

DRAINAGE AREA—145 square miles.

GAGE—A standard chain gage is fastened on the outer side of the downstream handrail. The length of chain from the bottom of the weight to the marker is 40.28 feet. The elevation of zero is 722.88 feet above sea level. Bench Mark No. 1 is top of right abutment, downstream corner, elevation 746.63 feet above sea level. The gage is read twice daily by employees of the Westinghouse Electric & Mfg. Co.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the Cable Ave. Viaduct. The initial point for soundings is point on downstream handrail directly above top edge of left bridge seat coping.

CHANNEL—The channel is straight above and below the station for 1,000 feet, and is walled in. There is a low dam about 200 feet downstream. Both banks are high and do not overflow except in backwater floods from the Monongahela River. The bed is composed of gravel and muddy clay.

REMARKS—This station is within reach of backwater floods from the Monongahela River.

DISCHARGE MEASUREMENTS OF TURTLE CREEK AT EAST PITTSBURGH, ALLEGHENY COUNTY, PA.

(Drainage area 145 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
	1914							
15	July 9,	Wilson & Taylor, ...	83	85	0.38	1.19	32	0.6 msmt.
16	Sept. 26,	Bowen & Brady, ...	56	45	0.47	0.79	21	0.6 msmt.

DISCHARGE TABLE FOR TURTLE CREEK AT EAST PITTSBURGH, ALLEGHENY COUNTY, FROM JAN. 1, 1914.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
0.00	8	.20	275	.40	1235	.60	2730	.80	5010
.10	8	.30	305	.50	1390	.70	2820	.90	5120
.20	8	.40	335	.60	1545	.80	2910	9.00	5230
.30	9	.50	370	.70	1400	.90	3000	.10	5335
.40	10	.60	405	.80	1455	7.00	3100	.20	5440
.50	11	.70	440	.90	1510	.10	3200	.30	5545
.60	12	.80	475	5.00	1570	.20	3300	.40	5655
.70	15	.90	515	.10	1630	.30	3405	.50	5765
.80	20	3.00	555	.20	1690	.40	3510	.60	5875
.90	25	.10	595	.30	1750	.50	3615	.70	5985
1.00	30	.20	640	.40	1810	.60	3725	.80	6095
.10	40	.30	695	.50	1875	.70	3835	.90	6200
.20	50	.40	750	.60	1940	.80	3945	10.00	6305
.30	65	.50	775	.70	2005	.90	4055	.10	6410
.40	80	.60	825	.80	2075	8.00	4165	.20	6515
.50	100	.70	875	.90	2150	.10	4270	.30	6620
.60	120	.80	925	6.00	2225	.20	4375	.40	6725
.70	145	.90	975	.10	2300	.30	4480	.50	6830
.80	170	4.00	1025	.20	2380	.40	4585		
.90	195	.10	1075	.30	2465	.50	4690		
2.00	220	.20	1125	.40	2550	.60	4795		
.10	245	.30	1180	.50	2640	.70	4900		

Note.—This table is only applicable subsequent to Jan. 1, 1914, and is based on 2 discharge measurements made in 1914 together with former curve.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF TURTLE CREEK AT EAST PITTSBURGH, ALLEGHENY COUNTY, PA.

1914	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.
1, ...	3.00	220	2.65	422	1.70	145	2.63	416	1.95	208	1.44	82	1.34	71	0.90	25	1.23	54
2, ...	2.10	245	2.25	290	1.75	158	3.00	555	1.85	182	1.39	78	1.44	88	1.00	30	1.18	48
3, ...	1.65	132	2.20	275	1.75	158	2.73	450	1.75	158	1.34	71	1.36	74	1.02	33	1.21	53
4, ...	2.02	225	2.15	260	1.70	145	2.47	360	1.85	182	1.59	118	1.34	71	1.02	33	1.11	41
5, ...	2.30	305	2.10	245	1.78	165	2.60	405	2.20	275	1.44	88	1.26	59	1.15	45	1.13	43
6, ...	1.95	208	2.07	238	1.73	152	2.20	275	2.50	370	1.44	88	1.16	46	1.10	40	1.25	58
7, ...	2.15	260	1.95	208	2.25	290	2.17	266	1.90	195	1.36	74	1.24	56	1.05	35	1.10	40
8, ...	2.10	245	1.80	170	2.50	370	2.05	232	1.87	188	1.34	71	1.22	53	1.58	116	1.20	50
9, ...	2.08	242	1.53	106	1.85	182	2.30	305	2.05	232	1.36	74	1.18	48	1.45	90	1.09	30
10, ...	2.20	275	1.80	170	1.90	195	2.10	245	2.07	238	1.34	71	1.18	48	1.30	65	1.00	30
11, ...	3.30	305	1.70	145	2.00	220	2.07	238	2.10	245	1.24	56	1.20	50	1.10	40	1.05	35
12, ...	2.00	220	1.43	86	2.17	266	2.00	220	2.67	430	1.24	56	1.10	40	1.08	38	1.05	35
13, ...	*3.45	200	1.43	86	2.43	346	1.93	202	2.83	487	1.24	56	1.50	100	1.05	35	1.10	40
14, ...	3.05	200	2.03	228	4.03	1040	1.95	208	2.10	245	1.24	56	1.70	145	1.00	30	0.95	28
15, ...	2.95	535	2.80	475	4.25	1150	3.23	654	1.95	208	0.99	30	1.20	50	1.05	35	1.04	34
16, ...	2.89	511	1.55	110	3.73	890	4.13	1090	1.93	202	1.14	44	0.95	28	0.80	20	1.05	35
17, ...	2.82	483	1.60	120	3.40	780	3.45	752	1.95	208	1.14	44	1.20	50	0.90	25	1.00	30
18, ...	2.50	370	1.63	128	3.23	654	2.35	320	1.90	195	1.14	44	1.22	53	0.95	28	1.07	37
19, ...	1.98	215	2.87	508	2.70	440	2.60	405	1.95	208	1.14	44	1.18	48	1.00	30	1.02	32
20, ...	1.80	170	2.60	405	2.40	335	2.60	405	1.77	162	1.09	39	1.05	35	1.15	45	1.05	35
21, ...	1.83	178	2.93	527	2.63	416	2.47	360	1.70	145	1.04	34	1.05	35	1.02	33	0.97	28
22, ...	2.35	320	3.30	685	3.17	628	2.30	305	1.65	132	1.29	64	1.12	42	0.95	28	0.88	24
23, ...	2.67	430	2.45	352	1.73	152	2.14	257	1.67	138	1.14	44	1.12	42	0.80	20	0.85	22
24, ...	2.05	232	1.85	182	1.70	145	2.05	232	1.65	132	1.04	34	1.42	84	1.12	42	1.18	48
25, ...	1.75	158	1.62	125	1.98	215	2.27	296	1.60	120	0.94	27	1.10	40	1.12	42	1.33	70
26, ...	2.55	388	1.57	114	2.07	238	3.70	875	1.68	128	1.09	39	1.00	30	1.05	35	0.83	22
27, ...	2.30	305	1.85	182	2.07	238	2.60	405	1.55	110	2.14	257	1.02	32	1.10	40	0.80	20
28, ...	2.30	305	2.45	352	3.57	810	2.40	335	1.63	128	1.64	130	1.08	38	1.20	50	0.91	26
29, ...	2.20	275	.....	.....	2.75	458	2.17	266	1.55	110	1.24	56	1.12	42	1.85	182	0.92	26
30, ...	2.20	275	.....	.....	2.80	475	1.90	195	1.65	132	1.39	78	1.10	40	1.80	170	0.95	28
31, ...	2.70	440	.....	.....	2.75	458	.....	.....	1.45	90	.....	.....	1.05	35	1.22	53	.....	.....

*Creek frozen Jan. 13 and 14, and discharge estimated from climatological records.

ESTIMATED MONTHLY DISCHARGE OF TURTLE CREEK AT EAST PITTSBURGH, ALLEGHENY COUNTY, PA.

(Drainage area 145 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	535	132	286	1.972	2.273
February,	685	86	257	1.772	1.845
March,	1150	145	396	2.731	3.148
April,	1090	195	384	2.648	2.955
May,	487	90	199	1.372	1.581
June,	257	27	68	0.469	0.523
July,	145	30	54	0.372	0.429
August,	182	20	49	0.338	0.390
September,	70	20	37	0.255	0.284

Creek frozen Jan. 13 and 14, and discharge estimated from climatological records.

SHENANGO RIVER.

DESCRIPTION OF BASIN.

The Shenango River, which forms, with the Mahoning River, at a point about 5 miles south of New Castle, Lawrence County, the Beaver River, rises in the southwestern part of Crawford County, Pennsylvania, about 5 miles southeast of Conneaut Lake, in the Pymatuning Swamp. The general course of the stream is southerly with numerous large sweeps to the east and west, crossing once for a short distance into Ohio but immediately returning into Pennsylvania. The total length from the head of Pymatuning Swamp to the junction with the Mahoning River is approximately 80 miles and the drainage area above the mouth is 1,080 square miles, of which 793 are in Pennsylvania.

The main tributaries of the stream are the Little Shenango, which joins it at Greenville, from the east; Pymatuning Creek, from the west, just above Sharpsville; Big Yankee Run, from the west at South Sharon; Deer Creek from the west just below Pulaski; and Neshannock Creek, from the east at New Castle, the latter being by far the largest, draining approximately 243 square miles.

The upper portion of the watershed lies within the once glaciated area and the main river and its major tributaries all find their sources in extensive swamp areas, while their valleys are broad and

flat. Descending the main stream, however, the valley becomes narrower and the hillsides more abrupt until near the mouth the valley again becomes wide and flat. A large portion of the watershed is under cultivation and the timber areas, except in the swamps, are not extensive.

The slope of the stream through the swamp, for the first 20 miles of its course, is at approximately 2 feet per mile, becoming a little more rapid as it descends, its slope through Mercer County being about 3 feet per mile. The total fall from its source in Pymatuning Swamp, at elevation about 1020 feet, to its mouth, at elevation about 760 feet, is 260 feet, or at the rate of 3.25 feet per mile.

From Greenville northward the watershed is not thickly inhabited, but southward from this point industries are more or less congested and the valley is thickly populated, becoming more so as the mouth is approached. The principal towns along the main stream, going southward, are Jamestown, Greenville, Sharpsville, Sharon, South Sharon, or Farrell, Pulaski and New Castle, the combined population of which is approximately 75,000. Some of these towns obtain their water supply from the Shenango River and the stream is very largely used by the steel plants, railroads and other industries which are numerous in this valley. Only a small amount of water power is developed on this stream, largely at grist and flour mills, the total installation not amounting to over 600 horsepower.

The mean annual precipitation over the upper portion of this watershed is about 40 inches, decreasing as the mouth is approached.

The discharge of the stream has been measured since September, 1909, at Sharon, Pa., since January, 1910, at New Castle, and at Turnerville, Crawford County since February 1, 1912. Additional stations were established in September and December, 1913, and January, 1914, on the Shenango River at Sharpsville and Little Shenango River at Salem and Greenville respectively.

OHIO BASIN—STATION NO. 31.

SHENANGO RIVER AT TURNERVILLE, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, steel, through-truss highway bridge at Turnerville, Crawford County, the bridge having a total span of 105 feet.

RECORDS AVAILABLE—Discharge complete from February 1, 1912, to September 30, 1914.

DRAINAGE AREA—152 square miles.

GAGE—A standard chain gage is fastened to the downstream hand-rail; the length of chain is 24.54 feet. The elevation of zero is 970 feet above mean sea level. Bench Mark No. 1 is a chisel mark on south end of east abutment, elevation 987.084 feet above mean sea level, or 17.084 feet above gage datum. The gage is read by S. A. Marvin. An automatic gage in connection with a weir above the bridge was established October 9, 1913, to supplement the gage heights at the highway bridge during low stages.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge and by wading at riffle during low stages. The initial point for soundings is top edge east abutment, downstream side.

CHANNEL—The channel is straight for 200 feet above and below the station. The right bank overflows during extreme floods, while the left bank is high and not subject to overflow. The bed is composed of gravel.

REMARKS—A staff gage, located on the downstream side of the east abutment and graduated from 0 to 10 feet, is read during frozen periods; the elevation of zero of this gage is 976 feet above mean sea level.

DISCHARGE MEASUREMENTS OF SHENANGO RIVER AT TURNERVILLE, CRAWFORD COUNTY, PA.

(Drainage area 152 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
	1914							
17	Mar. 16,	Munn, ...	101	632	1.67	9.42	1052	
18	Mar. 18,	Munn, ...	103	708	2.19	10.26	1549	
19	Aug. 12,	Munn, ...	55	109	0.14	3.90	15	Msmt. at riffle.
20	Aug. 20,	Munn, ...	51	100	0.08	3.72	8	Msmt. at riffle.
21	Sept. 4,	Munn, ...	60	124	0.25	4.11	31	Msmt. at riffle.

Note.—All widths, areas, mean velocities, etc., referred to section at Turnerville bridge.

DISCHARGE TABLE FOR SHENANGO RIVER AT TURNERVILLE, CRAWFORD COUNTY, FROM OCT. 1, 1913.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
		.20	308	.90	876	.60	1858	.30	4050
		.30	319	979.00	904	.70	1906	.40	4177
†.00	00	.40	335	.10	933	.80	1959	.50	4309
.10	6.6	.50	351	.20	963	.90	2012	.60	4445
.20	13.3	.60	368	.30	992	982.00	2068	.70	4588
.30	21.6	.70	386	.40	1022	.10	2128	.80	4725
.40	53.2	.80	404	.50	1053	.20	2187	.90	4871
.50	74.4	.90	422	.60	1085	.30	2248	985.00	5021
.60	97.8	977.00	441	.70	1118	.40	2311	.10	5178
.70	123.	.10	460	.80	1153	.50	2377	.20	5341
.80	151.	.20	479	.90	1186	.60	2445	.30	5513
.90	180.	.30	499	980.00	1220	.70	2515	.40	5691
‡.92	186.	.40	520	.10	1255	.80	2586	.50	5877
		.50	541	.20	1290	.90	2661	.60	6069
		.60	562	.30	1326	983.00	2739	.70	6265
		.70	584	.40	1363	.10	2821	.80	6467
		.80	606	.50	1400	.20	2906	.90	6671
Chain	Gage.	.90	628	.60	1438	.30	2993	986.00	6877
		978.00	651	.70	1476	.40	3084	.10	7094
975.40	.186	.10	674	.80	1515	.50	3179	.20	7321
50	200	.20	696	.90	1554	.60	3277	.30	7558
20	214	.30	723	*981.00	1593	.70	3377	.40	7789
.70	233	.40	747	.10	1633	.80	3481	.50	8080
.80	242	.50	772	.20	1675	.90	3587	.60	8275
.90	257	.60	796	.30	1717	984.00	3696		
976.00	272	.70	824	.40	1762	.10	3811		
.10	287	.80	850	.50	1809	.20	3929		

*981.00—Table corrected for overflow. Below 975.40 Weir is used to determine discharge.
†Head on weir. ‡Top of notch.

ICE DISCHARGE TABLE FOR SHENANGO RIVER AT TURNERVILLE, CRAWFORD COUNTY, FROM FEB. 1, 1912, TO SEPT. 30, 1914.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
8.00	.....	.50	26	6.00	188	.50	477	9.00	877
.10	.....	.60	41	.10	204	.60	501	.10	908
.20	.....	.70	47	.20	220	.70	525	.20	939
.30	.....	.80	53	.30	237	.80	550	.30	970
.40	3	.90	60	.40	254	.90	575	.40	1002
.50	3.5	5.00	68	.50	272	8.00	600	.50	1035
.60	4	.10	76	.60	290	.10	626	.60	1068
.70	6	.20	84	.70	309	.20	652	.70	1101
.80	9	.30	94	.80	329	.30	679	.80	1135
.90	12	.40	104	.90	349	.40	706	.90	1169
4.00	15	.50	117	7.00	369	.50	733	10.00	1203
.10	18	.60	130	.10	389	.60	761		
.20	22	.70	143	.20	410	.70	789		
.30	26	.80	157	.30	431	.80	818		
.40	31	.90	172	.40	453	.90	847		

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF SHENANGO RIVER AT TURNERVILLE, CRAWFORD COUNTY, PA.

1913. DAY.	OCT. G. H.	OCT. Dis.	NOV. G. H.	NOV. Dis.	DEC. G. H.	DEC. Dis.
1,	*73.68	6	0.61	100	0.58	93
2,	73.73	8	0.56	88	0.57	91
3,	73.77	10	0.56	88	0.55	86
4,	74.04	26	0.56	88	0.54	84
5,	74.19	37	0.53	81	0.51	77
6,	74.04	26	†0.50	74	0.45	64
7,	73.84	13	0.40	53	0.43	70
8,	73.72	8	0.38	49	0.60	98
9,	*73.67	6	0.45	64	0.65	110
10,	†0.09	6	0.56	88	0.74	134
11,	0.11	8	0.62	103	0.81	153
12,	0.12	9	0.71	126	0.76	139
13,	0.12	9	76.46	345	0.81	153
14,	0.12	9	79.67	1110	0.81	153
15,	0.12	9	§81.58	1850	0.83	159
16,	0.11	8	§81.16	1660	0.82	156
17,	0.13	9	79.61	1090	0.83	159
18,	0.13	10	78.11	676	0.83	159
19,	0.13	10	77.40	520	0.80	151
20,	0.18	16	77.04	449	0.68	118
21,	0.27	30	76.80	404	0.71	126
22,	0.33	38	76.40	335	0.68	118
23,	0.29	33	76.04	278	0.67	115
24,	0.39	51	75.84	248	0.84	162
25,	0.55	86	75.52	208	0.86	165
26,	0.55	86	0.86	165	0.77	142
27,	0.55	86	0.75	137	0.77	142
28,	0.65	110	0.66	113	0.92	186
29,	0.69	121	0.58	93	0.80	151
30,	0.68	118	0.60	98	0.75	137
31,	0.64	108	.....	.....	0.69	121

*Oct. 1-9 weir in construction. †Oct. 9-Nov. 6, actual readings on weir gage. ‡Nov. 6, automatic gage. §Corrected for overflow. Weir gage used Oct. 10-Nov. 12, Nov. 26-Dec. 31, inclusive. Discharge from relation curve between weir and chain gage. Oct., Nov. and Dec. revised; the rest of the year as published in 1913 report remains unchanged.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF SHENANGO RIVER AT TURNERVILLE, CRAWFORD COUNTY, PA.

1914	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.	G. H.	Dis.
1, ...	0.66	113	79.31	995	0.35	44	78.01	653	75.80	242	0.23	23	0.13	10	0.09	6	0.21	20
2, ...	0.64	108	78.68	820	0.29	33	78.27	715	75.43	190	0.22	22	0.15	12	0.07	4	0.20	19
3, ...	0.67	115	77.96	642	0.29	33	78.71	829	0.79	148	0.22	22	0.16	14	0.07	4	0.22	23
4, ...	0.73	131	77.30	499	0.28	31	78.54	782	0.71	126	0.23	23	0.14	11	0.07	4	0.27	30
5, ...	0.76	139	76.61	370	0.25	26	77.57	556	0.90	180	0.29	33	0.09	6	0.07	4	0.25	26
6, ...	0.83	159	76.22	306	0.28	31	76.76	397	76.82	406	0.28	31	0.08	5	0.07	4	0.21	20
7, ...	0.87	171	76.12	291	0.35	44	77.04	449	77.24	487	0.24	25	0.07	4	0.09	6	0.18	16
8, ...	75.50	208	76.10	288	0.40	53	78.55	785	77.27	493	0.20	19	0.07	4	0.10	7	0.15	12
9, ...	75.89	256	75.96	266	0.42	57	79.22	968	76.65	378	0.19	17	0.08	5	0.08	5	0.12	9
10, ...	76.32	322	75.78	239	0.42	57	78.60	798	76.14	294	0.17	15	0.11	8	0.07	4	0.12	9
11, ...	76.58	357	0.84	162	0.47	68	78.04	660	76.86	415	0.16	14	0.12	9	0.14	11	0.13	10
12, ...	76.78	400	0.78	145	0.69	121	78.19	696	80.18	1280	0.17	15	0.13	10	0.16	14	0.11	8
13, ...	76.83	409	0.72	129	0.87	171	78.02	656	*82.18	2170	0.17	15	0.15	12	0.19	17	0.12	9
14, ...	76.57	364	0.61	100	0.91	183	77.24	507	*81.68	1900	0.12	9	0.29	23	0.16	14	0.12	9
15, ...	76.08	285	0.60	98	76.64	376	76.68	383	79.91	1190	0.09	6	0.45	64	0.12	9	0.12	9
16, ...	75.83	246	0.59	96	79.02	910	76.76	397	78.10	674	0.09	6	0.43	59	0.11	8	0.10	7
17, ...	75.86	251	0.57	91	80.33	1340	76.80	404	76.93	423	0.08	5	0.43	59	0.10	7	0.09	6
18, ...	75.88	254	0.52	79	80.13	1270	76.86	415	76.16	296	0.09	6	0.41	55	0.10	7	0.09	6
19, ...	77.83	246	0.40	53	78.56	788	76.48	349	75.67	225	0.13	10	0.34	45	0.10	7	0.08	5
20, ...	75.83	246	0.38	49	77.48	537	76.02	276	0.87	171	0.17	15	0.25	26	0.10	7	0.10	7
21, ...	76.17	298	0.38	49	76.83	409	75.46	194	0.82	156	0.20	19	0.19	17	0.10	7	0.10	7
22, ...	76.32	322	0.38	49	76.19	302	0.90	180	0.67	105	0.28	31	0.16	14	0.09	6	0.10	7
23, ...	76.36	329	0.40	53	75.84	248	0.78	145	0.63	98	0.25	28	0.15	12	0.11	8	0.10	7
24, ...	76.72	390	0.39	51	75.78	239	0.73	131	0.54	58	0.25	26	0.16	14	0.16	14	0.10	7
25, ...	77.28	495	0.35	44	75.92	260	75.91	258	0.50	74	0.26	28	0.16	14	0.17	15	0.10	7
26, ...	77.48	537	0.31	38	76.18	300	78.37	740	0.44	51	0.22	22	0.14	11	0.18	16	0.10	7
27, ...	77.76	597	0.31	38	76.99	439	78.00	651	0.41	55	0.18	16	0.12	9	0.16	14	0.11	8
28, ...	79.11	936	0.31	38	80.55	1420	78.10	674	0.38	49	0.16	14	0.11	8	0.16	14	0.11	8
29, ...	80.08	1250	.....	.....	*81.99	2060	77.19	477	0.32	38	0.15	12	0.08	5	0.21	20	0.11	8
30, ...	80.64	1450	.....	.....	80.78	1510	76.46	345	0.27	30	0.13	10	0.08	5	0.22	22	0.10	7
31, ...	80.20	1290	.....	.....	79.14	945	.....	.....	0.24	26	.....	.....	0.09	6	0.25	26	.....	.....

*Corrected for overflow on road. Weir gage used Jan. 1-7, Feb. 11-Mar. 14, April 22-24, May 3-5, and May 20-Sept. 30 inclusive.

ESTIMATED MONTHLY DISCHARGE OF SHENANGO RIVER AT TURNERVILLE, CRAWFORD COUNTY, PA.

(Drainage area 152 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
a1913.					
January,	2300	220	1030	6.776	7.812
February,	.....	.....	90	0.592	0.616
March,	5100	.....	958	6.308	7.267
April,	540	44	178	1.171	1.306
May,	127	22	49	0.322	0.371
June	442	14	95	0.625	0.698
July,	459	24	150	0.987	1.138
August,	20	8	12	0.079	0.091
September,	26	7	10	0.066	0.074
October,	121	6	36	0.237	0.273
November,	1850	49	359	2.362	2.635
December,	186	64	128	0.842	0.970
The year,	.....	.....	258	1.697	23.251
1914.					
January,	1450	108	409	2.691	3.102
February,	995	86	217	1.428	1.487
March,	2060	28	461	3.033	3.497
April,	968	181	516	3.395	3.788
May,	2170	25	401	2.638	3.042
June,	33	5	18	0.118	0.132
July,	64	4	18	0.118	0.136
August,	26	4	10	0.066	0.076
September,	30	5	11	0.072	0.080

a—Oct. 1-9 weir in construction. Oct. 9-Nov. 6, actual readings on weir gage. Discharges from relation curve between weir and chain gage. The figures given for Oct., Nov. and Dec., in the 1913 report have been revised.

LITTLE SHENANGO RIVER.

DESCRIPTION OF BASIN.

The Little Shenango River rises in the eastern part of Mercer County, Pennsylvania, about one mile west of Sandy Lake and flows in a westerly direction to its junction with Crooked Creek and thence southwesterly till it joins the Shenango River at Greenville, Pennsylvania.

The total drainage area of the basin (including that of Crooked Creek) is 107.3 square miles. The total length of the Little Shenango is about 18 miles, and of Crooked Creek about nine miles. The portion of the basin of the Little Shenango above its junction with Crooked Creek is generally low and swampy along the banks of the stream, but it is bordered by higher land with steep side slopes,

the maximum width of the basin being about five miles and the minimum width about three miles.

The basin of Crooked Creek is also low and swampy along the banks of the stream, but is bordered by higher land with gentle slopes, the maximum width of the basin being about seven miles and minimum being about five miles.

The lower basin of the Little Shenango has steep slopes down to the bed of the stream, the maximum width being about two miles and the minimum width about one mile.

The basin is covered with a scattered growth of woods and timber, the greater portion of the area being cleared for cultivation and pasture.

The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge has been measured since December 19, 1913, at Salem, and since January 1, 1914, at Greenville.

OHIO BASIN—STATION NO. 32.

LITTLE SHENANGO RIVER AT SALEM, PA.

DESCRIPTION OF STATION.

LOCATION—On highway bridge at Salem, Mercer County.

RECORDS AVAILABLE—Discharge measurements and gage heights January 1 to September 30, 1914.

DRAINAGE AREA—52 square miles.

GAGE—A staff gage is attached to the corner of the left abutment looking downstream at upstream face. The elevation of zero is arbitrary.

DISCHARGE MEASUREMENTS—Taken from the upstream side of the bridge. The initial point for soundings is face of right abutment looking downstream.

CHANNEL—The channel above and below the station is straight for 100 feet and 75 feet respectively. The right bank is about 6 feet above the zero of gage, while the left bank is 7 feet above the zero. The bed is composed of sand and clay.

REMARKS—A small run comes in just above the bridge.

DISCHARGE MEASUREMENTS OF LITTLE SHENANGO RIVER AT SALEM, MERCER COUNTY, PA.

(Drainage area 52 square miles).

No.	Date.	Hydrographer.	Width.	Area of Section.	Mean velocity.	Gage height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
1	1914 May 13,	Munn, ...	42	306	1.58	9.11	482	Road overflowed but would not turn meter buckets.

DAILY MEAN GAGE HEIGHTS OF LITTLE SHENANGO RIVER AT SALEM, MERCER COUNTY, PA.

1914.	JAN.	FEB.	MAR.	APR.	MAY.	JUNE.	JULY	AUG.	SEPT.
DAY.	G. H.	G. H.	G. H.	G. H.	G. H.	G. H.	G. H.	G. H.	G. H.
1, ...	3.2	6.05	*3.6	7.3	3.1	2.4	2.4	2.1	2.1
2, ...	3.4	5.6	*3.6	7.5	3.2	2.4	2.4	2.1	2.1
3, ...	3.2	4.8	*3.6	6.05	3.1	2.5	2.4	2.1	2.1
4, ...	3.4	4.6	*3.6	4.2	3.2	2.8	2.3	2.1	2.1
5, ...	3.6	4.9	*3.6	4.3	7.6	2.8	2.3	2.1	2.1
6, ...	3.8	4.7	*3.6	4.7	6.1	2.8	2.3	2.1	2.1
7, ...	3.4	4.9	*3.6	6.02	4.1	2.5	2.3	2.1	2.1
8, ...	3.4	4.8	*3.6	9.32	4.6	2.4	2.3	2.1	2.1
9, ...	3.8	4.7	*3.8	6.30	4.1	2.4	2.3	2.1	2.1
10, ...	4.1	4.3	*3.8	5.2	3.6	2.4	2.3	2.1	2.1
11, ...	4.8	3.9	*3.9	5.4	4.6	2.4	2.3	2.1	2.1
12, ...	4.8	3.9	*3.9	6.8	10.1	2.3	2.4	2.1	2.1
13, ...	4.8	3.6	*3.9	6.4	8.92	2.4	2.3	2.1	2.1
14, ...	4.7	3.3	*4.6	6.4	6.27	2.4	2.3	2.1	2.1
15, ...	4.7	*3.6	*5.3	6.2	4.2	2.4	2.3	2.1	2.1
16, ...	4.9	*3.6	7.85	7.2	3.9	2.4	2.3	2.1	2.1
17, ...	4.9	*3.6	7.85	7.6	3.9	2.5	2.3	2.1	2.1
18, ...	4.9	*3.6	4.9	5.6	3.7	2.4	2.3	2.3	2.1
19, ...	4.7	*3.6	4.6	4.9	3.6	2.4	2.3	2.2	2.1
20, ...	4.8	*3.6	4.3	4.7	3.6	2.4	2.3	2.2	2.1
21, ...	5.9	*3.6	4.2	4.1	3.2	2.5	2.3	2.1	2.1
22, ...	5.8	*3.6	4.7	3.8	3.1	4.3	2.3	2.1	2.1
23, ...	5.8	*3.6	3.9	3.4	3.1	3.8	2.3	2.7	2.1
24, ...	7.2	*3.6	3.2	3.2	2.8	3.2	2.3	2.6	2.1
25, ...	6.2	*3.6	3.2	7.6	2.8	2.6	2.3	2.2	2.1
26, ...	7.2	*3.6	4.6	9.46	2.6	2.4	2.2	2.1	2.1
27, ...	7.8	*3.6	6.85	7.28	2.6	2.2	2.1	2.1	2.1
28, ...	8.75	*3.6	8.88	5.8	2.6	2.2	2.1	2.1	2.1
29, ...	9.00	.....	6.90	5.1	2.6	2.3	2.1	2.1	2.1
30, ...	8.85	.....	6.90	5.1	2.6	2.3	2.1	2.1	2.0
31, ...	6.85	.....	7.10	.....	2.4	.....	2.1	2.1	.....

*Ice.

OHIO BASIN—STATION NO. 33.

LITTLE SHENANGO RIVER AT GREENVILLE, PA.

DESCRIPTION OF STATION.

LOCATION—On third highway bridge over river above its junction with the Shenango River. It is known as Quaker Bridge.

RECORDS AVAILABLE—Discharge complete from January 1 to September 30, 1914.

DRAINAGE AREA—107 square miles.

GAGE—A staff gage is attached to the upstream side of the right abutment, looking downstream. The elevation of zero is 944.50 feet above mean sea level. Bench Mark No. 1 is on southwest corner of northwest wingwall of right abutment looking downstream, elevation 958.135 feet above mean sea level. Bench Mark No. 2 is bronze tablet of U. S. G. S. at Commercial Hotel, Greenville, elevation 960.726 feet above mean sea level. The gage is read by M. Loutzenhiser.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is face of abutment on left side looking downstream.

CHANNEL—The channel is straight above and below the station for 250 feet and 300 feet respectively. Both banks are high and not subject to overflow. The bed is composed of sand and gravel.

DISCHARGE MEASUREMENTS OF LITTLE SHENANGO RIVER AT GREENVILLE, MERCER COUNTY, PA.

(Drainage area 107 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1912.		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
1	March 23	Ferris,	72	301	0.86	2.36	260	
2	March 27	Haslam,	74	322	1.14	2.64	368	
3	April 1	Haslam,	84	396	2.11	3.59	835	
4	April 4	Haslam,	69	284	0.64	2.12	181	
	1914.							
5	Jan. 30	Munn,	94	466	2.29	3.96	1068	
6	Jan. 30	Munn,	94	440	2.02	3.68	890	
7	Jan. 31	Munn,	92	394	1.55	3.18	610	
8	May 13	Munn,	94	528	2.96	4.62	1561	
9	June 17	Ferris,	65	225	0.08	1.23	18	Wading above station.
10	Sept. 2	Munn,	65	223	0.08	1.21	19	Wading above station.

Note—All widths, areas, mean velocities, referred to regular gaging station.

DISCHARGE TABLE FOR LITTLE SHENANGO RIVER AT GREENVILLE, MERCER COUNTY, FROM JAN. 1, 1914.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
1.00	2	.50	312	4.00	1097	.50	2355	7.00	4036
.10	8	.60	351	.10	1167	.60	2454	.10	4164
.20	17	.70	391	.20	1238	.70	2553	.20	4292
.30	27	.80	433	.30	1312	.80	2656	.30	4422
.40	37.5	.90	476	.40	1389	.90	2762	.40	4555
.50	50	3.00	522	.50	1467	6.00	2869	.50	4688
.60	64	.10	570	.60	1548	.10	2978	.60	4827
.70	80	.20	620	.70	1627	.20	3087	.70	4966
.80	99	.30	671	.80	1707	.30	3198	.80	5087
.90	121	.40	724	.90	1792	.40	3312	.90	5178
2.00	146	.50	780	5.00	1888	.50	3427	8.00	5289
.10	174	.60	839	.10	1978	.60	3547		
.20	206	.70	901	.20	2068	.70	3667		
.30	239	.80	964	.30	2161	.80	3789		
.40	274.5	.90	1028	.40	2258	.90	3912		

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF LITTLE SHENANGO RIVER AT GREENVILLE, MERCER CO., PA.

1914. DAY.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	1.82	103	3.14	590	*1.81	52	2.21	243	1.72	80	1.41	39	1.32	29	1.16	13	1.21	18
2,	1.90	121	3.19	615	*1.81	52	3.06	536	1.70	80	1.41	39	1.33	30	1.15	12	1.29	26
3,	1.82	103	2.49	308	*1.81	52	2.94	494	1.80	99	1.42	40	1.36	33	1.13	11	1.19	16
4,	1.90	121	2.23	216	*1.82	53	2.39	271	1.80	99	1.52	53	1.33	30	1.11	9	1.21	18
5,	1.95	133	2.19	203	*1.83	53	2.15	190	2.20	206	1.47	46	1.30	27	1.11	9	1.23	20
6,	2.10	174	2.03	154	*1.82	53	2.00	146	3.20	620	1.44	42	1.19	16	1.10	8	1.21	18
7,	1.90	121	2.00	146	*1.74	45	2.58	343	2.29	236	1.36	33	1.12	10	1.09	7	1.18	15
8,	1.90	121	2.29	236	*1.70	41	4.88	1370	2.01	149	1.33	30	1.12	10	1.09	7	1.14	12
9,	2.10	174	1.92	126	*1.69	40	3.76	939	1.90	121	1.34	31	1.14	12	1.08	7	1.12	10
10,	2.20	206	2.00	146	*1.68	39	2.74	408	1.91	123	1.32	29	1.18	15	1.20	17	1.11	9
11,	2.30	239	*1.90	63	*1.66	38	2.71	395	2.22	213	1.30	27	1.19	16	1.20	17	1.11	9
12,	2.40	274	*1.81	52	*1.68	39	2.28	222	6.28	3180	1.30	27	1.22	19	1.21	18	1.13	11
13,	2.40	274	*1.71	42	*1.70	41	2.41	278	5.03	1920	1.28	25	1.60	64	1.19	16	1.11	9
14,	2.30	239	*1.69	40	*1.78	48	2.12	180	4.16	1210	1.25	22	2.01	149	1.18	15	1.11	9
15,	2.10	174	*1.68	39	*2.74	335	2.05	160	2.71	395	1.24	21	1.61	66	1.20	17	1.11	9
16,	2.00	146	*1.69	40	4.15	1200	2.84	450	2.42	282	1.23	20	1.54	56	1.18	15	1.10	8
17,	2.01	149	*1.68	39	4.14	1200	2.46	297	2.10	174	1.23	20	1.50	50	1.19	16	1.10	8
18,	2.06	171	*1.68	39	3.19	615	2.30	239	2.00	146	1.20	17	1.49	49	1.19	16	1.11	9
19,	2.00	146	*1.81	52	2.24	219	2.20	206	1.94	131	1.18	15	1.40	33	1.18	15	1.10	8
20,	1.99	143	*1.79	50	1.96	136	2.10	174	1.93	128	1.20	17	1.40	33	1.19	16	1.08	7
21,	2.50	312	*1.78	48	1.84	108	3.10	174	1.91	123	1.23	20	1.39	36	1.20	17	1.09	7
22,	2.57	339	*1.76	47	1.92	126	2.10	174	1.87	114	1.35	32	1.38	35	1.20	17	1.09	7
23,	2.36	260	*1.75	46	1.92	126	1.92	126	1.82	103	1.50	50	1.38	35	1.32	29	1.08	7
24,	2.60	351	*1.76	47	1.86	112	1.80	99	1.79	97	1.70	80	1.36	33	1.49	49	1.08	7
25,	3.14	590	*1.75	46	2.17	196	1.71	82	1.74	88	1.50	50	1.34	31	1.40	33	1.07	6
26,	2.60	351	*1.78	48	2.32	246	4.61	1560	1.72	84	1.40	38	1.34	31	1.39	36	1.07	6
27,	2.80	433	*1.79	50	3.34	692	3.94	1060	1.70	80	1.38	35	1.33	30	1.31	28	1.11	9
28,	3.90	1080	*1.79	50	4.30	1310	2.50	312	1.65	72	1.35	32	1.20	17	1.30	27	1.12	10
29,	4.30	1310	.....	.....	3.52	792	2.30	239	1.60	64	1.33	30	1.19	16	1.24	21	1.11	9
30,	4.32	1330	.....	.....	3.34	692	2.01	149	1.52	58	1.31	28	1.17	14	1.20	17	1.09	7
31,	3.40	724	.....	.....	2.86	459	.....	.....	1.42	40	.....	.....	1.17	14	1.19	16	.....	.....

*Ice.

ESTIMATED MONTHLY DISCHARGE OF LITTLE SHENANGO RIVER AT GREENVILLE, MERCER COUNTY, PA.

(Drainage area 107 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	1330	103	334	1.321	3.588
February,	615	39	128	1.196	1.246
March,	1310	38	297	2.776	3.201
April,	1560	82	384	3.589	4.004
May,	3180	40	339	3.168	3.653
June,	80	15	33	0.308	0.344
July,	149	10	34	0.318	0.367
August,	49	7	15	0.140	0.161
September,	26	6	11	0.103	0.115

River frozen Feb. 11 to March 15.

PYMATUNING CREEK.

DESCRIPTION OF BASIN.

Pymatuning Creek rises in the southwestern part of Ashtabula County, Ohio, about six miles from the Pennsylvania state line and flows in a southeasterly direction for about twenty-seven miles to its junction with the Shenango River about three miles north of Sharpsville, Mercer County, Pennsylvania.

The total drainage area of the basin is 175.6 square miles having a length of about twenty-seven miles and a maximum width of about eleven miles. The minimum width is about three miles.

The basin of Pymatuning Creek is generally low and swampy along the banks of the stream, but the flats are bordered by high land with steep slopes on the east and by high land with moderate slopes on the west. The greater part of the area has been cleared for cultivation and pasture, although a portion is covered with a scattered growth of woods and timber. Pymatuning Creek has a quick runoff and the lower part of the basin is, therefore, subject to sudden and excessive floods.

The mean annual precipitation over this watershed is from 40 to 45 inches.

The discharge has been measured since January 1, 1914, at Orangeville, on the Ohio-Pennsylvania State Line.

OHIO BASIN—STATION NO. 34.

PYMATUNING CREEK BELOW ORANGEVILLE, PA.

DESCRIPTION OF STATION.

LOCATION—At first highway bridge over Pymatuning Creek above its junction with the Shenango River.

RECORDS AVAILABLE—Discharge complete from January 1, 1914, to September 30, 1914.

DRAINAGE AREA—170 square miles.

GAGE—A staff gage is fastened on the upstream side of the west abutment. The elevation of zero has been assumed 100 feet. Bench Mark No. 1 is on bridge seat at angle in east abutment on upstream side of bridge, elevation 112.96 feet. Bench Mark No. 2 is a large cut spike driven in the side of a large sugar maple at highwater mark Flood 1913, about 3 feet above ground, the tree being 550 feet east of the bridge and on the right side of road, elevation 115.79 feet. Bench Mark No. 3 is a large cut spike driven in the top of Cherry Corner Fence Post about 450 feet east of bridge on left side of road, elevation 111.31 feet. The gage is read by C. I. Mitcheltree.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge from top of handrail. The initial point for soundings is east end of handrail, downstream side, 1 foot west from abutment face.

CHANNEL—The channel is straight above and below the station for 150 feet. The right bank is high and not subject to overflow. The left bank overflows at gage height 5.40 feet. The bed is composed of gravel.

REMARKS—The mill at Orangeville produces some fluctuation in flow particularly at low periods.

DISCHARGE MEASUREMENTS OF PYMATUNING CREEK BELOW ORANGEVILLE, MERCER COUNTY, PA.

(Drainage area 170 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914.		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
1	Jan. 26	Munn,	80	272	2.25	3.75	612	
2	Jan. 28	Munn,	80	360	3.09	4.86	1112	
3	Jan. 29	Munn,	80	413	3.43	5.52	1416	
4	Jan. 29	Munn,	80	419	3.54	5.60	1482	
5	Mar. 13	Munn,	†80	*86	1.44	2.00	124	Ice msmt. Ice=0.6′.
6	June 17	Ferris,	50	34	0.20	0.67	7	Wading above station.
7	Aug. 25	Munn,	77	89	1.15	1.43	102	Wading above station.
8	Sept. 3	Munn,	76	83	0.97	1.35	80	Wading above station.
9	Sept. 9	Duff,	43	45	0.20	0.75	9	
10	Sept. 24	Duff,	24	12	0.50	0.68	6	

*Area below ice, water surface=2.00′, Ice=0.6′ thick.
†Width at gage height 2.00′.
All widths, areas, mean velocities referred to regular gaging station.

DISCHARGE TABLE FOR PYMATUNING CREEK BELOW ORANGEVILLE, MERCER COUNTY, FROM JAN. 1, 1914.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
0.60	2	.10	186	.60	561	.10	1194	.60	2416
.70	10	.20	208	.70	595	.20	1247	.70	2546
.80	20	.30	221	.80	629	.30	1301	.80	2680
.90	30	.40	240	.90	665	.40	*1358	.90	2817
1.00	41	.50	260	4.00	702	.50	1418	7.00	2959
.10	52	.60	281	.10	740	.60	1483	.10	3109
.20	63	.70	304	.20	780	.70	1550	.20	3264
.30	75	.80	327	.30	820	.80	1621	.30	3425
.40	87	.90	352	.40	862	.90	1697	.40	3601
.50	99	3.00	378	.50	905	6.00	1777	.50	3789
.60	112	.10	406	.60	950	.10	1863	.60	3984
.70	126	.20	435	.70	996	.20	1953	.70	4194
.80	140	.30	465	.80	1043	.30	2056	.80	4413
.90	154	.40	496	.90	1092	.40	2170		
2.00	170	.50	528	5.00	1142	.50	2290		

*Above gage height 5.40 these values include the overflow over road.

ICE DISCHARGE TABLE FOR PYMATUNING CREEK, BELOW ORANGEVILLE, MERCER COUNTY, FROM JAN. 1, 1914.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
0.00	0	.30	47.5	2.00	124	.70	248	.40	430
.70	6	.40	56.5	10	133.5	.80	270	.50	460
.80	12.5	.50	66	.20	154	.90	294	.60	492
.90	19	.60	76	.30	170.5	3.00	319	.70	524
1.00	26.5	.70	86.5	.40	188	.10	346	.80	558
.10	32	.80	98	.50	207	.20	373	.90	596
.20	39.5	.90	110.5	.60	227	.30	401	4.00	628

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF PYMATUNING CREEK BELOW ORANGEVILLE, MERCER COUNTY, PA.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	*2.85	282	4.95	1120	*1.65	82	3.90	665	2.55	270	0.90	30	0.85	25	0.70	10	1.10	52
2,	*2.80	270	3.75	612	*1.70	87	4.20	780	2.00	170	0.90	30	0.80	20	0.75	15	1.12	54
3,	*2.80	270	3.30	465	*1.80	98	3.80	629	1.60	112	0.85	25	0.80	20	0.70	10	1.00	41
4,	*2.75	259	3.05	392	*1.85	104	3.60	561	1.50	99	0.90	30	0.75	15	0.70	10	0.75	15
5,	*2.40	187	2.55	270	*1.80	98	3.30	465	1.40	87	1.30	75	0.70	10	0.65	4	1.00	41
6,	*2.00	124	2.20	208	*1.90	111	3.00	378	2.30	221	1.30	75	0.70	10	0.65	4	0.98	39
7,	*1.90	111	2.10	186	*1.95	117	2.90	352	2.40	240	1.15	58	0.75	15	0.60	2	0.98	39
8,	*1.95	117	1.90	154	*1.95	117	4.99	1140	2.40	240	1.10	52	0.70	15	0.90	30	0.75	15
9,	*2.10	138	*3.40	430	*2.00	124	5.36	1340	2.60	281	1.00	41	0.65	4	0.80	20	0.88	28
10,	*2.60	227	*3.20	372	*2.00	124	4.90	1090	2.40	240	0.90	30	0.60	2	0.70	10	0.82	22
11,	*2.70	247	*3.50	460	*1.95	117	4.20	780	2.20	203	0.90	30	0.60	2	1.10	52	0.82	22
12,	*2.65	237	*2.90	295	*1.90	111	4.25	800	6.10	1860	0.80	20	0.65	4	0.90	30	0.70	10
13,	*3.60	492	*1.50	66	*1.95	117	3.80	629	7.64	4070	0.80	20	0.70	10	0.80	20	0.70	10
14,	*3.70	525	*1.55	71	*2.05	131	3.25	450	6.75	2670	0.90	30	0.90	30	0.75	15	0.80	20
15,	*3.80	557	*1.40	57	*4.20	700	3.00	378	5.70	1550	0.70	10	1.30	75	0.75	15	0.80	20
16,	*3.60	492	*1.45	61	†5.57	1460	3.40	496	3.90	665	0.70	10	1.50	99	0.75	15	0.80	20
17,	*2.70	247	*1.40	57	†6.44	2220	2.90	352	3.15	430	0.65	4	1.85	147	0.70	10	0.82	22
18,	*2.80	270	*1.50	66	†5.59	1480	2.70	304	2.60	281	0.70	10	2.25	212	0.75	15	0.70	10
19,	*2.70	247	*1.45	61	4.35	841	2.60	281	2.00	170	0.70	10	2.20	203	0.70	10	0.70	10
20,	*2.60	227	*1.55	71	3.40	496	2.40	240	1.70	126	0.65	4	1.30	75	0.70	10	0.70	10
21,	*2.80	270	*1.50	66	3.00	378	2.00	170	1.60	112	0.65	4	1.30	75	1.00	41	0.70	10
22,	3.90	352	*1.55	71	2.40	240	1.80	140	1.50	99	0.70	10	1.10	52	0.80	20	0.80	20
23,	3.00	378	*1.60	76	2.00	170	1.70	126	1.20	63	0.90	30	0.95	36	0.75	15	0.75	15
24,	3.30	465	*1.55	71	1.80	140	1.50	99	1.05	46	1.00	41	0.90	30	1.20	63	0.75	15
25,	3.45	512	*1.50	66	1.80	140	1.40	87	1.10	52	1.00	41	0.80	20	1.20	63	0.68	7
26,	3.70	596	*1.45	61	2.40	240	4.60	960	1.05	46	0.95	36	0.85	25	1.25	69	0.75	15
27,	3.55	544	*1.40	57	2.45	250	†5.57	1460	1.00	41	0.90	30	0.80	20	1.15	58	0.65	4
28,	4.65	973	*1.50	66	4.75	1020	4.90	1090	1.00	41	0.90	30	0.80	20	1.10	52	0.63	7
29,	†5.50	1420	.....	.....	†6.38	2150	3.70	595	0.95	36	0.80	20	0.75	15	1.00	41	0.68	7
30,	†5.60	1480	.....	.....	†5.95	1740	3.20	425	0.95	36	0.90	30	0.75	15	1.05	46	0.68	7
31,	5.35	1330	.....	.....	5.00	1140	.....	.....	0.90	30	.....	.....	0.75	15	1.00	41	.....	.....

*Ice.
†Overflow.

ESTIMATED MONTHLY DISCHARGE OF PYMATUNING CREEK BELOW ORANGEVILLE, MERCER COUNTY, PA.

(Drainage area 170 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum	Minimum	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	1480	.....	447	2.629	3.031
February,	1120	.....	214	1.259	1.311
March,	2220	.....	527	3.100	3.574
April,	1460	87	575	3.382	3.773
May,	4070	30	470	2.765	3.188
June,	75	4	29	0.171	0.191
July,	212	2	42	0.247	0.285
August,	89	2	26	0.153	0.176
September,	54	4	20	0.118	0.132

Ice conditions Jan. 1-21, Feb. 9-Mar. 15 inclusive.

OHIO BASIN—STATION NO. 35.

SHENANGO RIVER AT SHARON, PA.

DESCRIPTION OF STATION.

LOCATION—At single span, steel, through-truss highway bridge at Chestnut Street, Sharon, Mercer County.

RECORDS AVAILABLE—Discharge complete from August 1, 1909, to September 30, 1914.

DRAINAGE AREA—611 square miles.

GAGE—A staff gage was originally fastened to cribbing on the right bank of the river about fifty feet above the Chestnut Street bridge. This gage, however, was washed out by high water and since then the gage heights have been obtained by measuring from the handrail to the water surface with a steel tape and plumb bob. The elevation of zero of the staff gage was 840 feet above mean sea level. Bench Mark No. 1 is U. S. G. S. bronze tablet on southeast abutment of Chestnut Street bridge, elevation 855.92 feet above mean sea level. The gage heights are obtained by employees of the Carnegie Steel Co.

DISCHARGE MEASUREMENTS—Taken from Mill Street and State Street bridges. The initial point for soundings on the Mill Street bridge is end of handrail, right side, looking downstream (measurements from upstream side). The initial point for soundings on the State Street bridge is top of left abutment (measurements from the downstream side). During former years dis-

charge measurements were taken from the Carnegie Plate Girder bridge and the Upper Wheatland bridge.

CHANNEL—The channel is straight above and below the station for 500 feet. The banks are approximately 12 feet above the river bed. The bed is composed of gravel and dirt.

DISCHARGE MEASUREMENTS OF SHENANGO RIVER AT SHARON, MERCER COUNTY, PA.

(Drainage area 611 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914.		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	Mill St. Bridge.
66	Mar. 7	Munn, ...	129	227	1.11	3.03	251	1.6 second feet added for sewer.
67	Mar. 9	Munn, ...	127	224	1.06	3.02	238	1.5 second feet added for sewer.
68	Mar. 13	Munn, ...	135	285	1.39	3.42	369	1.7 second feet added for sewer.
69	Mar. 15	Ferris, ...	144	496	2.91	5.20	1444	Mill St. bridge.
70	Mar. 16	Munn, ...	174	1582	1.94	7.27	3076	State St. bridge.
71	Mar. 19	Munn, ...	162	754	3.88	7.37	2927	Mill St. bridge.
72	Mar. 20	Munn, ...	146	553	2.80	5.71	1551	Mill St. bridge.
73	Mar. 29	Munn, ...	146	571	2.90	5.84	1659	Mill St. bridge.
74	Mar. 30	Munn, ...	174	2024	2.80	9.84	5667	State St. bridge.
75	Aug. 7	Munn, ...	50	41	0.66	1.87	27	Wading between Mill St. and State St.
76	Aug. 26	Munn, ...	86	128	1.46	2.75	188	Wading between Mill St. and State St.
77	Sept. 3	Munn, ...	79	103	1.07	2.46	110	Wading between Mill St. and State St.
78	Sept. 30	Ferris, ...	33	21	1.18	1.88	25	Wading at riffle below Chestnut St.

Note:—The widths, areas and mean velocities are computed from the cross section of the Shenango River at the stations where the meter measurements were taken. Gage heights and discharges referred to Chestnut street gage.

DISCHARGE TABLE FOR SHENANGO RIVER AT SHARON, MERCER COUNTY, FROM APRIL 1, 1913, TO SEPT. 30, 1914.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.-ft	Feet.	Sec.-ft	Feet.	Sec.-ft	Feet.	Sec.-ft	Feet.	Sec.-ft
1.70	18	.50	858	.20	2705	.90	5840	.60	11564
.80	21	.60	911	.30	2880	10.00	6000	.70	11798
.90	26.4	.70	965	.40	2955	.10	6170	.80	12082
2.00	34.5	.80	1020	.50	3050	.20	6340	.90	12266
.10	45.2	.90	1076	.60	3145	.30	6515	13.00	12580
.20	59.6	5.00	1133	.70	3240	.40	6700	.10	12794
.30	76.6	.10	1192	.80	3340	.50	6890	.20	12988
.40	97.2	.20	1251	.90	3440	.60	7100	.30	13202
.50	119.2	.30	1311	8.00	3540	.70	7310	.40	13426
.60	142.6	.40	1374	.10	3640	.80	7520	.50	13670
.70	166.5	.50	1438	.20	3743	.90	7730	.60	13904
.90	216.8	.60	1506	.30	3850	11.00	7940	.70	14138
3.00	243.8	.70	1570	.40	3960	.10	8160	.80	14372
.10	271.8	.80	1638	.50	4070	.20	8380	.90	14606
.20	301	.90	1707	.60	4180	.30	8600	14.00	14840
.30	331	6.00	1777	.70	4290	.40	8820	.10	15074
.40	362	.10	1850	.80	4405	.50	9040	.20	15308
.50	396	.20	1928	.90	4525	.60	9260	.30	15542
.60	432	.30	2000	9.00	4645	.70	9480	.40	15776
.70	472	.40	2078	.10	4768	.80	9700	.50	16010
.80	514	.50	2157	.20	4890	.90	9920	.60	16244
.90	559	.60	2239	.30	5015	12.00	10160	.70	16478
4.00	605	.70	2321	.40	5145	.10	10394	.80	16712
.10	653	.80	2405	.50	5280	.20	10628	.90	16946
.20	702	.90	2491	.60	5413	.30	10862	15.00	17180
.30	753	7.00	2578	.70	5550	.40	11096		
.40	805	.10	2670	.80	5690	.50	11330		

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF SHENANGO RIVER AT SHARON, MERCER COUNTY, PA.

1913.	APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.		OCT.		NOV.		DEC.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	6.19	1920	3.49	393	2.83	199	3.86	541	2.28	73	1.96	31	2.16	54	2.94	228	3.23	310
2,	5.47	1420	3.35	347	2.76	181	3.58	425	2.24	66	1.95	30	2.15	52	2.82	196	3.22	307
3,	5.17	1230	3.23	310	2.77	184	3.29	328	2.19	58	1.98	33	2.28	70	2.72	171	3.19	298
4,	4.93	1090	3.11	275	2.64	152	3.00	244	2.12	48	1.99	34	2.28	73	2.74	176	3.15	286
5,	4.74	987	2.97	236	2.59	140	2.86	207	2.06	41	1.96	31	2.23	73	2.69	164	3.10	272
6,	4.44	826	2.85	204	2.69	164	3.23	310	2.12	48	1.91	27	2.21	61	2.67	159	3.04	255
7,	4.25	728	2.76	181	2.72	171	3.56	418	2.04	39	1.88	25	2.21	61	2.60	143	3.06	266
8,	4.07	639	2.72	171	2.63	150	3.61	436	2.06	43	1.88	25	2.27	72	2.60	143	3.38	357
9,	3.85	536	2.68	162	2.55	131	3.77	501	2.05	40	1.89	26	2.19	58	2.78	186	3.61	436
10,	3.66	456	2.62	147	2.56	133	4.15	678	2.06	43	1.91	27	2.26	70	3.24	313	3.61	436
11,	4.11	658	2.51	122	2.63	150	3.73	485	2.30	77	1.91	27	2.10	45	3.62	440	3.67	460
12,	4.50	838	2.37	91	2.60	143	3.44	376	2.14	51	1.89	26	2.09	44	3.73	485	3.51	400
13,	4.50	858	2.46	110	2.58	138	3.61	436	2.02	37	1.89	26	2.07	42	5.15	1220	3.74	489
14,	4.62	922	2.53	126	2.51	122	3.31	334	1.90	26	1.89	26	2.04	39	8.11	3650	3.94	577
15,	4.52	869	2.50	119	2.27	72	3.04	255	1.86	24	1.82	22	2.04	39	8.87	4490	4.08	643
16,	4.18	692	2.74	176	2.10	45	2.66	157	1.97	32	1.84	23	2.07	42	9.08	4680	3.96	587
17,	3.76	497	2.98	233	2.26	70	2.67	159	1.90	26	1.88	25	2.03	38	7.97	3510	3.84	532
18,	3.53	407	2.92	222	2.17	55	3.62	440	1.75	20	2.02	37	2.12	48	6.51	2160	3.76	497
19,	3.38	357	2.78	186	2.10	45	3.04	255	1.78	20	1.99	34	2.09	44	5.74	1600	3.60	432
20,	3.29	328	2.72	171	2.11	47	2.76	181	1.81	22	1.91	27	2.07	42	5.39	1370	3.33	341
21,	3.15	286	2.64	152	2.19	58	2.63	150	1.82	23	1.98	33	2.27	72	5.07	1170	3.22	307
22,	3.08	252	2.82	196	2.33	83	2.56	131	1.87	25	2.00	34	2.48	115	4.73	982	3.28	325
23,	2.99	241	2.98	233	2.41	99	2.34	85	1.90	26	1.95	30	2.64	152	4.40	805	3.31	334
24,	2.93	225	2.68	162	2.43	104	2.23	65	2.02	37	2.07	42	2.77	184	4.13	668	3.81	518
25,	2.90	217	2.63	150	2.36	89	2.37	91	2.04	39	2.12	48	3.18	295	3.83	528	4.21	707
26,	2.82	196	2.53	124	2.78	186	2.37	91	2.00	34	2.01	36	3.33	528	3.57	421	4.03	619
27,	2.95	230	2.76	181	3.30	331	2.46	110	2.07	42	2.00	34	3.58	425	3.40	363	3.56	418
28,	3.32	337	3.55	414	3.38	357	2.46	110	2.02	37	2.06	41	3.25	316	3.31	334	3.56	418
29,	3.68	464	3.69	468	3.48	389	2.42	102	2.06	43	2.01	36	3.11	275	3.19	296	3.75	493
30,	3.69	468	3.57	421	3.35	336	2.30	77	2.16	54	2.00	34	3.07	263	3.21	304	3.61	436
31,	.....	.....	3.01	247	.....	.....	2.36	89	2.04	39	.....	.....	3.08	252	.....	.....	3.56	418

Note:—Data published in 1913 report superseded from April 1 due to change in rating table.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF SHENANGO RIVER AT SHARON, MERCER COUNTY, PA.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	3.32	337	8.14	3680	2.84	201	6.62	2280	4.62	922	2.50	119	2.35	87	1.98	33	2.26	70
2,	3.26	319	6.80	2400	2.86	207	6.95	2530	4.13	668	2.50	119	2.20	60	2.02	37	2.39	95
3,	3.30	331	5.96	1750	2.88	212	6.84	2440	3.72	480	2.50	119	2.30	77	1.93	29	2.44	106
4,	3.52	408	5.62	1520	2.85	204	6.33	2060	2.45	389	2.61	145	2.30	77	1.90	26	2.42	102
5,	3.90	559	5.18	1240	2.87	209	5.80	1640	4.10	653	3.04	255	2.10	45	1.90	26	2.22	63
6,	4.02	615	4.60	911	2.95	230	5.30	1310	5.76	1610	3.04	255	2.05	40	1.89	26	2.22	63
7,	4.13	668	4.51	863	3.02	249	6.26	1970	5.22	1260	2.84	201	2.10	45	1.86	24	2.23	65
8,	4.29	749	4.11	658	3.02	249	9.11	4780	5.09	1190	2.64	152	2.25	68	2.04	39	2.14	51
9,	4.52	869	3.60	432	3.06	258	8.75	4350	5.20	1250	2.53	126	2.15	52	2.17	55	2.11	47
10,	5.14	1220	3.79	510	3.10	272	7.48	3030	4.76	998	2.46	108	2.00	34	2.00	34	2.22	63
11,	5.16	1230	3.63	444	3.14	283	6.81	2410	5.20	1250	2.38	93	2.00	24	2.21	61	2.15	52
12,	4.91	1080	3.36	350	3.20	301	7.06	2630	9.38	5120	2.38	93	2.00	34	2.42	102	2.12	48
13,	4.59	906	3.18	295	3.32	337	6.36	2060	11.52	9080	2.59	140	2.04	39	2.39	95	2.06	41
14,	4.55	881	2.94	228	3.91	564	5.66	1540	11.21	8400	2.38	93	2.62	147	2.36	89	2.00	34
15,	4.52	869	2.88	212	5.51	1440	5.46	1410	8.96	4600	2.25	68	3.10	272	2.16	54	1.96	31
16,	4.40	805	2.88	212	7.52	3070	6.22	1940	6.64	2270	2.25	68	3.10	272	2.30	67	1.86	24
17,	4.31	774	2.86	207	9.40	5140	5.80	1640	5.36	1350	2.25	68	3.63	444	2.12	48	2.04	39
18,	4.24	722	2.78	186	8.87	4490	5.40	1370	4.77	1000	2.15	52	3.56	418	2.06	41	2.00	34
19,	4.25	728	2.80	191	7.37	2980	5.22	1260	4.23	717	2.19	58	3.35	347	2.07	42	1.96	33
20,	4.42	816	2.84	201	5.94	1740	4.86	1050	3.78	506	2.20	60	3.06	261	2.12	48	1.98	33
21,	5.17	1230	2.75	179	5.10	1190	4.48	847	3.52	403	2.20	60	2.77	184	2.14	51	1.95	30
22,	5.24	1280	2.76	181	4.67	949	4.11	658	3.33	341	2.33	83	2.48	115	2.46	110	1.90	28
23,	5.09	1190	2.96	233	4.33	763	3.84	532	3.15	286	2.92	222	2.30	77	2.26	70	1.92	28
24,	5.72	1580	2.92	222	4.11	658	3.59	428	3.10	272	2.88	212	2.23	63	2.40	97	1.95	30
25,	6.32	2020	2.66	157	4.36	784	5.40	1370	2.98	238	2.56	157	2.18	57	2.90	217	1.94	30
26,	5.98	1730	2.67	159	5.20	1250	8.94	4570	2.91	220	2.52	124	2.18	57	2.75	179	1.92	28
27,	6.06	1840	2.70	166	5.63	1520	8.36	3920	2.82	196	2.40	97	2.13	50	2.54	129	1.92	28
28,	7.74	3230	2.68	162	8.32	3370	6.78	2390	2.76	181	2.35	87	2.02	37	2.42	102	1.91	27
29,	8.54	4110	.....	.....	9.38	5120	5.92	1720	2.70	166	2.25	68	2.06	41	2.42	102	1.86	24
30,	8.63	4210	.....	.....	9.65	5480	5.23	1270	2.66	157	2.25	68	2.06	41	2.36	89	1.83	25
31,	8.48	4050	.....	.....	8.23	3780	.....	.....	2.52	124	.....	.....	2.09	44	2.26	70	.....	.....

ESTIMATED MONTHLY DISCHARGE OF SHENANGO RIVER AT SHARON, MERCER COUNTY, PA.

(Drainage area 611 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum	Minimum	Mean.	Second-feet per square mile.	Depth in inches.
a1913.					
April,	1920	196	640	1.047	1.168
May,	468	91	218	0.357	0.412
June,	536	45	157	0.257	0.287
July,	678	65	267	0.437	0.504
August,	77	20	40	0.065	0.075
September,	48	22	31	0.051	0.057
October,	528	38	127	0.208	0.240
November,	4680	142	1050	1.718	1.917
December,	707	255	425	0.696	0.802
1914.					
January,	4210	319	1340	2.193	2.528
February,	3680	157	641	1.049	1.092
March,	5480	201	1550	2.537	2.925
April,	4780	428	2050	3.355	3.744
May,	9080	124	1490	2.439	2.813
June,	255	52	119	0.195	0.218
July,	444	84	117	0.191	0.220
August,	217	24	71	0.116	0.134
September,	106	24	46	0.075	0.084

a Data published in 1913 report superseded from April 1 due to change in rating table.

OHIO BASIN—STATION NO. 36.

SHENANGO RIVER AT NEW CASTLE, PA.

DESCRIPTION OF STATION.

LOCATION—At West Washington Street bridge over Shenango river, at New Castle.

RECORDS AVAILABLE—Discharge complete from January 1, 1910, to September 30, 1914.

DRAINAGE AREA—797 square miles.

GAGE—A chain gage is attached to the bridge. The length of chain from the bottom of the weight to the marker is 26.28 feet. The elevation of zero is 787 feet above sea level. Bench Mark No. 1 is top coping northwest corner, south end of north wingwall of east abutment of West Washington Street bridge over Shenango river, elevation 797.49 feet above sea level.

DISCHARGE MEASUREMENTS—Taken from the upstream side of the bridge. The initial point for soundings is in line with top of west face of east abutment.

CHANNEL—The channel is straight for 200 feet above and 700 feet below the station. The right bank is high and not subject to overflow. The left bank is a high railroad embankment and overflows at extreme floods. The bed is composed of rock and gravel and is permanent.

REMARKS—The gage readings from August 26, 1912 to July 15, 1914, were taken by measuring from a tack set in bridge floor at elevation 809.67 feet above sea level.

DISCHARGE MEASUREMENTS OF SHENANGO RIVER AT NEW CASTLE, LAWRENCE COUNTY, PA.

(Drainage area 797 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
	1913.							
1	Mar. 10,	Woolcock,	205	739	3.78	791.11	2792	0.6 method.
2	Mar. 25,	Woolcock,	232	3211	6.97	801.31	22380	0.6 method.
3	Feb. 2,	Woolcock,	211	1334	3.29	792.5	4389	0.6 method.
4	Feb. 17,	Woolcock,	167	371	0.73	788.53	271	0.6 method.
5	Feb. 21,	Woolcock,	168	478	1.10	788.83	525	0.6 method.
6	Feb. 22,	Woolcock,	185	540	1.39	790.17	750	0.6 method.
7	Nov. 14,	Woolcock,	220	1516	3.78	793.86	5736	0.6 method.
	1914.							
8	Mar. 9,	Munn,	172	597	0.63	789.12	377	Washington St. section.
9	Mar. 12,	Munn,	174	626	0.69	789.31	429	Washington St. section.
10	Mar. 15,	Ferris,	207	1021	2.39	791.80	2460	Washington St. section.
11	Mar. 16,	Ferris,	.....	.....	.....	793.41	.....	Unreliable.
12	Mar. 17,	Munn,	220	1547	3.51	794.18	5428	Washington St. section.
13	Mar. 18,	Ferris,	216	1448	2.36	793.56	3412	Washington St. section.
14	Mar. 19,	Ferris,	214	1271	2.16	792.97	2752	Washington St. section.
15	Mar. 20,	Ferris,	213	1113	1.02	792.59	1173	Washington St. section.
16	Mar. 21,	Ferris,	195	855	1.13	790.91	964	Washington St. section.
17	May 13,	Ferris,	224	1985	4.47	796.10	8870	Washington St. section.
18	Aug. 6,	Haslam,	45	40	1.32	788.2	53	Black bridge.
19	Aug. 25,	Brown,	65	77	1.51	788.55	116	Black bridge.
20	Aug. 26,	Brown,	90	115	2.31	788.95	266	Black bridge.
21	Sept. 23,	Munn,	45	35	1.17	788.17	41	Black bridge.
22	Sept. 28,	Munn,	45	33	1.00	788.07	33	Black bridge.
23	Sept. 29,	Ferris,	34	28	0.89	788.03	25	Wading below water works.
24	Oct. 5,	Munn,	32	24	0.75	787.99	18	Wading below water works.

DISCHARGE TABLE FOR SHENANGO RIVER AT NEW CASTLE, LAWRENCE COUNTY, FROM JAN. 1, 1910.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.ft.	Feet.	Sec.ft.	Feet.	Sec.ft.	Feet.	Sec.ft.	Feet.	Sec.ft.
787.60	0	790.20	966	792.80	3568	795.40	7540	798.00	13070
787.70	1.1	790.30	1040	792.90	3692	795.50	7720	798.10	13310
787.80	4.5	790.40	1116	793.00	3818	795.60	7900	798.20	13560
787.90	10.5	790.50	1195	793.10	3946	795.70	8090	798.30	13810
788.00	19.6	790.60	1276	793.20	4076	795.80	8280	798.40	14060
788.10	31.7	790.70	1360	793.30	4209	795.90	8480	798.50	14310
788.20	46.6	790.80	1447	793.40	4344	796.00	8670	798.60	14570
788.30	64.6	790.90	1536	793.50	4482	796.10	8870	798.70	14830
788.40	86.0	791.00	1628	793.60	4622	796.20	9070	798.80	15090
788.50	111.2	791.10	1723	793.70	4764	796.30	9270	798.90	15350
788.60	140	791.20	1820	793.80	4908	796.40	9480	799.00	15610
788.70	172	791.30	1920	793.90	5055	796.50	9680	799.10	15880
788.80	207	791.40	2023	794.00	5205	796.60	9890	789.20	16150
788.90	246	791.50	2126	794.10	5360	796.70	10110	799.30	16420
789.00	288	791.60	2230	794.20	5510	796.80	10320	799.40	16700
789.10	332	791.70	2336	794.30	5660	796.90	10540	799.50	16970
789.20	377	791.80	2442	794.40	5820	797.00	10750	799.60	17250
789.30	424	791.90	2548	794.50	5980	797.10	10980	759.70	17530
789.40	474	792.00	2656	794.60	6150	797.20	11200	799.80	17820
789.50	526	792.10	2764	794.70	6310	797.30	11420	799.90	18100
789.60	581	792.20	2874	794.80	6480	797.40	11650	800.00	18390
789.70	638	792.30	2985	794.90	6650	757.50	11880		
789.80	699	792.40	3097	795.00	6820	797.60	12120		
789.90	762	792.50	3212	795.10	7000	797.70	12350		
790.00	827	792.60	3328	795.20	7170	797.80	12590		
790.10	895	792.70	3447	795.30	7350	797.90	12830		

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF SHENANGO RIVER AT NEW CASTLE, LAWRENCE COUNTY, PA.

1910.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.		OCT.		NOV.		DEC.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1, ...	788.56	128	790.49	1190	796.34	9350	788.94	268	790.51	1200	789.31	429	788.42	91	788.33	71	788.09	30	788.48	106	789.13	345	790.58	1260
2, ...	88.59	137	90.30	1040	97.58	12100	88.91	250	90.77	1420	89.56	559	88.42	91	88.33	71	88.14	38	88.42	91	89.23	391	90.48	1180
3, ...	88.67	162	90.30	1040	97.13	11000	88.87	234	91.16	1780	90.00	827	88.47	104	88.33	71	88.41	88	88.42	91	89.45	500	90.35	1060
4, ...	88.86	230	90.75	1400	96.47	9620	89.30	424	92.06	2720	90.31	1050	88.50	111	88.33	71	88.73	182	88.42	91	89.45	500	90.27	1020
5, ...	88.94	263	90.97	1600	96.94	8560	89.94	788	92.23	2910	90.21	973	88.52	117	88.33	71	88.53	120	88.50	111	89.38	464	90.16	938
6, ...	88.94	263	90.68	1340	95.62	7940	89.83	718	91.73	2370	90.17	945	88.56	128	88.33	71	88.85	227	89.50	526	89.32	434	90.06	868
7, ...	88.94	263	90.35	1080	96.02	6860	89.77	681	90.87	1510	90.00	827	88.59	137	88.30	65	88.86	230	90.09	888	89.25	400	90.04	854
8, ...	88.97	275	90.10	896	94.11	5380	89.81	705	90.42	1130	89.74	662	88.57	131	88.25	56	88.77	196	89.74	662	89.08	323	89.92	775
9, ...	89.06	314	89.96	801	92.73	3480	89.80	699	90.00	827	89.42	484	88.51	114	88.24	54	88.61	143	89.41	479	89.08	301	89.74	662
10, ...	89.06	314	89.80	699	91.84	2480	89.51	531	89.72	650	89.30	424	88.50	111	88.24	54	88.51	114	89.19	372	89.23	391	89.49	521
11, ...	89.02	297	89.56	559	91.11	1730	89.30	424	89.43	490	89.22	386	88.46	101	88.23	52	88.46	101	89.08	323	90.05	861	89.46	505
12, ...	88.98	280	89.54	548	91.09	1710	89.17	363	89.26	405	89.14	350	88.46	101	88.17	42	88.44	96	89.01	292	90.59	1270	89.46	505
13, ...	88.94	263	89.44	495	91.34	1960	89.04	306	89.20	377	89.19	372	88.73	182	88.16	41	88.50	111	88.93	259	90.65	1320	89.42	484
14, ...	88.93	259	89.30	424	90.80	1460	88.99	284	89.21	382	89.13	345	88.68	166	88.16	41	88.44	96	88.84	223	90.49	1190	89.38	464
15, ...	88.90	246	89.30	424	90.07	875	88.87	234	89.09	328	89.06	314	88.65	156	88.16	41	88.35	75	88.77	196	91.04	1670	89.35	449
16, ...	88.88	238	89.74	662	89.91	768	88.86	230	88.95	287	89.00	288	88.50	111	88.16	41	88.43	94	88.71	175	90.93	1560	89.29	419
17, ...	89.21	382	90.24	996	89.90	762	88.80	207	88.89	242	88.96	271	88.47	104	88.16	41	88.40	86	88.60	140	90.92	1550	89.28	391
18, ...	90.60	1280	90.50	1200	89.81	705	88.79	203	89.05	310	89.02	297	88.50	111	88.21	48	88.24	54	88.59	137	90.67	1340	89.21	382
19, ...	92.18	2850	90.50	1200	89.72	650	88.86	230	88.93	259	88.91	250	88.42	91	88.17	42	88.04	24	88.55	126	90.47	1170	89.21	382
20, ...	92.43	3130	90.46	1160	89.72	650	88.98	280	88.91	250	88.77	196	88.34	73	88.16	41	87.98	18	88.50	111	90.30	1040	89.16	359
21, ...	92.40	3100	90.41	1120	89.67	621	89.30	424	89.00	288	88.65	156	88.33	71	88.16	41	87.98	18	88.47	104	90.20	966	89.32	434
22, ...	92.62	3350	90.66	1330	89.67	621	89.36	454	89.24	396	88.67	162	88.34	73	88.16	41	87.98	18	88.57	131	90 10	895	89.40	474
23, ...	92.22	2900	90.66	1330	89.64	604	89.30	424	90.02	841	88.68	166	88.37	80	88.16	41	88.17	42	88.57	131	90.12	909	89.43	490
24, ...	91.55	2150	90.49	1190	89.56	559	89.31	429	89.79	693	88.57	131	88.38	82	88.16	41	89.14	350	88.60	140	90.38	1090	89.31	429
25, ...	91.19	1810	90.39	1110	89.48	516	90.81	1460	89.51	531	88.51	114	88.42	91	88.15	39	89.23	326	88.71	175	91.02	1650	89.74	662
26, ...	91.06	1680	90.18	952	89.40	474	92.47	2180	89.40	474	88.52	117	88.42	91	88.16	41	88.90	246	88.94	263	91.16	1780	90.18	952
27, ...	91.15	1770	90.79	1440	89.26	405	91.80	2440	89.26	405	88.43	94	88.41	88	88.15	39	88.77	196	89.10	382	90.94	1570	90.32	1060
28, ...	91.37	1990	98.92	5080	89.21	382	91.56	2190	89.21	382	88.34	73	88.34	73	88.12	35	88.73	182	89.06	310	90.86	1500	90.67	1340
29, ...	91.21	1830	.....	.....	89.17	363	91.04	1670	89.18	368	88.34	73	88.33	71	88.13	36	88.67	162	89.12	341	90.32	1460	92.71	3460
30, ...	90.90	1540	.....	.....	89.04	306	90.68	1340	89.10	332	88.42	91	88.33	71	88.11	33	88.58	134	89.17	363	90.73	1390	93.91	5070
31, ...	90.65	1320	.....	.....	88.99	284	.....	.....	89.23	391	.....	.....	88.33	71	88.10	32	.....	.....	89.20	377	.....	.....	94.10	5360

Interpolated from Sharon records.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF SHENANGO RIVER AT NEW CASTLE, LAWRENCE COUNTY, PA.

1911.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.		OCT.		NOV.		DEC.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1, ...	793.33	4250	791.34	1960	790.25	1000	790.96	1590	790.59	1270	788.78	200	789.67	621	788.27	59	789.38	464	793.34	4260	789.35	449	790.04	854
2, ...	93.73	4810	90.86	1500	90.03	847	90.71	1370	90.67	1340	88.96	271	88.73	183	88.26	57	89.25	400	94.00	5200	89.80	699	89.96	801
3, ...	94.27	5620	90.59	1270	89.86	787	90.53	1220	90.48	1180	88.79	203	88.72	179	88.30	65	89.14	350	92.57	3290	89.75	668	89.82	711
4, ...	92.82	3590	90.42	1130	89.67	621	90.40	1120	90.41	1120	88.75	189	88.62	146	88.43	94	89.00	288	91.78	2420	89.87	743	89.73	656
5, ...	92.05	2710	90.29	1030	89.47	510	91.35	1970	90.29	1030	88.65	156	88.41	88	88.64	153	88.99	284	91.39	2010	90.04	854	89.59	575
6, ...	91.29	1910	90.10	895	89.46	505	91.89	2540	90.04	854	88.56	128	88.28	61	88.54	123	89.01	292	91.55	2180	90.22	981	89.50	526
7, ...	90.85	1490	90.04	854	89.48	516	91.24	1860	89.82	711	88.53	120	88.24	54	88.38	83	89.01	292	92.36	3060	91.08	1700	89.55	553
8, ...	90.69	1350	90.06	868	89.36	454	90.78	1430	89.43	490	88.49	109	88.22	50	88.30	65	88.93	259	91.54	2170	91.11	1730	89.72	650
9, ...	90.71	1370	90.01	834	89.44	495	90.58	1260	89.23	391	88.47	104	88.16	41	88.29	63	89.06	314	90.74	1400	90.69	1350	90.29	1030
10, ...	90.25	1000	89.97	808	89.79	693	90.45	1160	89.21	382	88.37	80	88.27	59	88.31	67	89.32	434	90.56	1240	90.50	1200	91.11	1730
11, ...	90.87	1510	89.75	668	90.03	847	90.26	1010	89.21	382	88.21	48	88.99	234	88.28	61	89.38	464	90.46	1160	90.41	1120	90.86	1500
12, ...	94.02	3840	89.60	581	89.99	821	90.18	952	89.13	345	88.56	128	88.76	193	88.25	56	89.13	345	90.30	1040	90.47	1170	91.71	2350
13, ...	93.74	4810	89.71	644	90.14	923	90.18	952	88.99	284	89.03	301	88.61	143	88.22	50	88.89	242	90.10	895	90.91	1540	93.35	4280
14, ...	94.07	5110	90.80	1450	90.04	854	90.51	1200	88.93	259	88.83	219	88.54	123	88.20	47	89.39	469	89.85	780	90.52	1210	93.44	4400
15, ...	94.92	6680	92.66	3400	89.87	743	90.81	1460	88.88	238	88.66	159	88.39	84	88.21	48	94.53	6030	89.67	621	90.34	1070	93.58	4590
16, ...	93.85	5130	92.73	3480	89.80	699	90.49	1190	88.86	230	88.56	123	88.25	56	88.25	56	97.04	10800	89.54	548	90.35	1080	93.36	4290
17, ...	91.94	2590	92.64	3380	89.80	699	90.34	1070	88.86	230	88.46	101	88.42	91	88.33	71	95.04	6890	90.15	930	90.50	1200	92.41	3110
18, ...	91.21	1830	93.20	4080	90.15	930	90.16	938	88.91	250	88.41	88	88.33	71	88.56	128	92.19	2860	93.43	4380	92.23	2910	91.65	2280
19, ...	90.69	1310	93.01	3830	90.50	1200	90.19	959	89.01	292	88.34	73	88.21	48	88.63	150	91.22	1840	93.25	4140	92.43	3130	91.15	1770
20, ...	90.25	1090	92.07	2730	90.57	1250	91.11	1730	89.03	301	88.33	71	88.19	45	88.52	117	90.73	1390	91.95	2600	91.79	2430	90.71	1370
21, ...	90.03	847	91.39	2010	90.31	1050	91.16	1780	89.11	336	88.32	69	88.17	42	88.31	67	90.33	1060	91.62	2250	91.60	2230	90.37	1090
22, ...	89.82	711	90.92	1550	90.22	981	91.64	2270	89.60	581	88.26	57	88.22	50	88.26	57	89.90	762	91.12	1740	91.19	1810	90.30	1040
23, ...	89.55	553	90.46	1160	90.37	1090	92.33	3020	89.12	341	88.21	48	88.26	57	88.30	65	89.58	570	91.04	1670	90.85	1490	91.03	1660
24, ...	89.33	439	90.17	945	90.14	923	91.55	2180	88.92	254	88.20	47	88.42	91	88.42	91	89.40	474	91.13	1750	90.85	1490	91.04	1670
25, ...	89.26	405	90.23	988	89.88	749	90.76	1410	88.99	284	88.26	57	88.46	101	88.46	101	89.24	396	90.14	923	90.91	1540	90.85	1490
26, ...	89.32	434	90.62	1290	89.81	705	90.20	1040	88.86	230	88.31	67	88.42	91	88.53	120	89.14	350	89.82	711	90.60	1280	90.85	1490
27, ...	90.02	841	90.94	1570	90.16	938	90.07	875	88.75	189	88.93	259	88.41	88	88.65	156	89.00	288	89.67	621	90.50	1200	91.26	1880
28, ...	93.40	4340	90.58	1260	90.60	1280	90.01	834	88.65	156	90.66	1330	88.38	82	89.81	705	89.46	500	89.56	559	90.42	1130	91.13	1750
29, ...	94.04	5270	.....	.....	90.42	1130	90.30	1040	88.46	101	89.91	768	88.37	80	92.46	3170	90.62	1290	89.48	516	90.45	1160	90.47	1170
30, ...	93.51	4500	.....	.....	90.77	1429	90.24	996	88.22	50	88.98	280	88.31	67	90.96	1590	91.20	1820	89.42	484	90.27	1020	90.50	1200
31, ...	92.55	3270	.....	.....	91.14	1760	.....	.....	88.19	45	.....	.....	88.29	63	89.77	581	.....	.....	89.39	469	.....	.....	91.84	2480

Interpolated from Sharon records.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF SHENANGO RIVER AT NEW CASTLE, LAWRENCE COUNTY, PA.

1912.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.		OCT.		NOV.		DEC.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1, ...	792.68	3420	790.36	1090	791.68	2320	793.84	4970	792.33	3020	789.06	314	788.49	109	788.61	143	791.16	1780	788.69	169	789.98	814	788.76	193
2, ...	91.83	2470	90.25	1000	91.22	1840	94.41	5840	91.41	2030	89.02	297	88.44	96	88.58	134	91.27	1890	88.64	153	89.71	644	89.06	314
3, ...	91.14	1760	90.20	966	90.77	1420	94.96	6750	90.91	1540	89.24	396	88.46	101	88.61	143	90.64	1310	88.46	101	89.60	581	89.22	386
4, ...	90.63	1300	90.16	938	90.39	1110	94.13	5400	90.45	1160	89.30	424	88.63	150	88.58	124	90.16	988	88.30	65	89.50	526	89.12	341
5, ...	89.93	1780	90.07	857	90.05	861	93.14	4000	90.01	831	89.06	314	88.50	111	88.56	128	89.73	656	88.32	69	89.35	449	89.07	319
6, ...	89.75	668	89.85	730	89.82	711	92.73	3480	89.72	650	89.06	314	88.42	91	88.60	140	89.31	429	88.35	75	89.25	400	90.42	1130
7, ...	89.79	693	89.66	615	89.76	675	92.68	3420	89.60	581	89.10	332	88.47	104	88.56	128	89.22	386	88.34	73	89.28	415	91.28	1909
8, ...	89.78	687	89.53	542	89.80	699	93.22	4100	89.43	490	89.05	310	88.39	84	88.54	123	88.98	259	88.21	48	89.22	386	91.05	1680
9, ...	89.79	693	89.45	500	90.04	854	92.39	3090	89.35	449	88.89	242	88.41	88	88.57	131	88.90	246	88.28	61	89.69	632	90.91	1540
10, ...	89.83	718	89.40	474	90.02	841	91.69	2320	89.29	419	88.77	196	88.51	114	88.86	230	88.76	193	88.61	143	90.21	973	90.70	1360
11, ...	89.62	593	89.33	459	89.76	675	91.13	1750	89.24	396	88.73	182	88.71	175	89.08	323	88.63	150	90.47	1170	90.20	966	90.64	1310
12, ...	89.44	495	89.30	424	89.81	705	90.68	1340	89.35	449	88.66	159	88.98	280	89.48	516	88.58	134	90.65	1320	90.13	916	89.84	724
13, ...	89.36	454	89.28	415	90.02	841	90.40	1120	89.49	521	88.63	146	88.78	200	89.06	310	88.47	104	90.34	1070	89.84	724	89.32	434
14, ...	89.30	424	89.19	372	90.15	930	90.70	1360	89.60	581	88.58	124	88.64	153	88.88	238	88.40	86	89.44	495	89.66	615	88.86	230
15, ...	89.28	415	89.13	345	91.55	2180	93.07	2910	89.71	644	88.57	131	88.50	111	88.76	193	88.38	82	88.90	246	89.59	575	88.72	179
16, ...	89.29	419	89.06	301	92.78	3540	93.06	3920	89.87	743	89.40	474	88.57	131	88.70	172	88.31	67	88.82	215	89.46	505	88.64	152
17, ...	89.23	391	89.01	292	93.36	4290	92.11	2780	90.24	996	89.84	724	88.86	230	88.62	146	88.31	67	88.82	215	89.41	479	88.71	175
18, ...	89.40	474	89.02	297	94.12	5390	91.71	2350	90.30	1040	89.54	548	89.12	341	88.52	117	88.34	73	88.76	193	89.40	474	88.98	280
19, ...	90.11	902	89.21	382	94.84	6550	91.16	1780	90.15	930	89.23	391	88.72	179	88.61	143	88.40	86	89.21	382	89.31	429	89.04	306
20, ...	90.38	1100	89.90	762	94.36	6760	90.66	1330	90.02	841	89.00	288	88.50	111	88.87	234	88.37	80	90.26	1010	89.25	400	89.06	314
21, ...	90.27	1020	90.36	1090	94.04	5270	90.32	1060	89.79	693	88.81	211	89.21	382	88.70	172	88.34	73	89.90	762	89.21	382	89.03	301
22, ...	90.10	895	90.50	1200	94.39	4330	90.04	854	89.53	543	88.75	189	89.21	382	88.64	158	88.34	73	89.58	570	89.16	359	88.88	228
23, ...	89.98	814	90.25	1000	93.05	3880	90.04	854	89.31	429	88.68	166	88.86	230	88.59	137	88.82	215	91.41	2030	89.09	328	88.73	182
24, ...	90.02	841	90.10	896	93.76	4850	89.89	756	89.14	350	88.64	153	89.96	794	88.64	153	90.00	827	93.74	4820	89.02	297	88.60	140
25, ...	90.00	827	90.16	938	93.50	4480	89.73	656	89.06	314	88.66	159	90.09	888	88.63	150	89.90	762	94.06	5300	88.94	263	88.55	126
26, ...	89.91	768	92.10	2760	92.74	3500	89.56	559	88.96	267	88.67	162	89.50	526	95.11	*7020	89.41	479	94.05	5280	88.88	238	88.48	106
27, ...	89.74	662	93.42	4370	92.35	3040	89.48	516	88.86	230	88.62	146	89.19	372	94.07	5310	89.18	368	93.58	4690	88.84	223	88.46	101
28, ...	89.64	604	93.38	4320	92.61	3340	89.43	490	88.86	230	88.56	128	89.00	288	90.95	1580	89.03	301	93.12	3970	88.76	193	88.43	91
29, ...	89.61	587	92.46	3170	94.00	5200	90.98	1610	88.87	234	88.55	126	88.88	238	90.46	1160	88.95	267	91.58	2210	88.73	182	88.42	91
30, ...	90.22	981	.....	.....	95.11	7020	93.27	4170	88.97	275	88.51	114	88.78	200	90.16	938	88.81	211	90.50	1200	88.80	207	88.43	94
31, ...	90.53	1220	.....	.....	94.55	6060	.....	.....	89.01	292	.....	.....	88.69	169	90.76	1410	.....	.....	90.24	996	.....	.....	89.70	638

Jan. 1 to Aug. 25, interpolated from Sharon records. *Cloudburst at New Castle.

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF SHENANGO RIVER AT NEW CASTLE, LAWRENCE COUNTY, PA.

1913.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.		OCT.		NOV.		DEC.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1, ...	791.10	1720	789.88	749	791.32	1940	792.22	2900	789.50	526	789.13	345	789.07	319	787.89	10	788.53	120	788.41	88	789.74	662	789.29	419
2, ...	91.07	1690	89.64	604	90.66	1330	91.78	2420	89.31	429	89.00	288	89.03	598	87.91	11	88.49	109	88.52	117	89.63	598	89.28	416
3, ...	90.57	1250	89.61	587	89.84	724	91.33	1950	89.19	372	88.92	254	89.51	531	87.88	9	88.47	104	88.69	169	89.32	434	89.29	419
4, ...	90.56	1240	89.35	449	89.98	814	90.86	1500	89.10	332	88.80	207	89.46	505	87.77	3	88.44	96	88.86	230	89.20	377	89.30	424
5, ...	90.30	1040	89.35	449	90.26	1010	90.52	1210	88.96	271	88.68	166	89.32	434	88.16	41	88.45	99	88.69	169	89.08	323	89.27	410
6, ...	90.46	1160	89.78	687	90.20	966	90.34	1070	88.86	230	88.61	143	89.34	444	88.58	134	88.41	88	88.57	131	88.98	280	89.26	406
7, ...	93.22	4100	90.11	902	89.72	650	90.12	909	88.77	196	88.68	166	89.44	495	88.53	120	88.40	86	88.53	120	88.89	242	89.38	464
8, ...	95.14	7070	90.07	875	89.38	464	89.93	781	88.70	172	88.69	169	89.55	553	88.49	109	88.41	88	88.54	123	88.82	215	89.41	479
9, ...	95.70	8090	89.56	559	89.56	559	89.75	668	88.55	127	88.64	153	89.60	581	88.46	101	88.42	91	88.53	120	88.85	227	89.51	531
10, ...	95.22	7210	88.71	175	91.02	1650	89.62	593	88.39	84	88.60	140	90.22	981	88.52	117	88.45	99	88.52	117	89.12	341	89.57	564
11, ...	94.23	5560	88.70	172	91.48	2100	89.97	808	88.39	84	88.58	134	90.02	841	88.75	189	88.49	109	88.54	123	89.61	587	89.57	564
12, ...	94.94	6720	88.64	153	91.60	2230	90.27	1020	88.43	94	88.58	134	89.62	593	88.86	230	88.49	109	88.56	128	90.25	1000	89.54	548
13, ...	94.70	6310	88.56	128	91.68	2320	90.20	966	88.50	111	88.57	131	89.41	479	88.67	162	88.47	104	88.56	126	90.30	1040	89.54	548
14, ...	93.46	4430	88.54	123	91.97	2620	90.33	1060	88.56	128	88.59	137	89.20	377	88.58	134	88.43	94	88.49	109	93.28	4180	89.53	542
15, ...	91.75	2890	88.53	120	91.86	2510	90.33	1100	88.68	166	88.57	131	89.10	332	88.56	128	88.41	88	88.49	109	94.41	5840	89.52	537
16, ...	91.26	1880	88.60	140	91.24	1860	90.05	861	88.73	182	88.50	111	89.00	288	88.49	109	88.46	101	88.48	106	94.14	5420	89.47	510
17, ...	92.97	3780	88.53	120	90.60	1280	89.98	814	88.82	215	88.36	77	88.97	375	88.42	91	88.54	123	88.43	94	93.47	4440	89.43	490
18, ...	95.06	6960	89.19	372	90.29	1030	90.33	1060	88.84	223	88.30	65	88.96	371	88.40	86	88.50	111	88.42	91	92.53	3250	89.38	464
19, ...	94.61	6170	88.55	126	89.91	768	89.42	484	88.88	219	88.33	71	88.93	259	88.41	88	88.50	111	88.39	84	91.54	2170	89.37	459
20, ...	93.86	5000	88.56	128	89.63	598	89.34	444	88.84	223	88.31	67	88.87	334	88.40	86	88.54	123	88.31	67	91.22	1840	89.38	464
21, ...	93.36	4290	88.83	219	89.47	510	89.10	332	88.81	211	88.44	96	88.78	200	88.37	80	88.56	128	88.16	41	91.22	1840	89.31	439
22, ...	92.95	3760	89.39	469	89.42	484	89.08	301	88.90	246	88.45	99	88.74	186	88.34	73	88.54	123	88.04	24	91.16	1780	89.30	424
23, ...	92.70	3450	89.69	632	89.92	775	89.07	319	89.04	306	88.48	106	88.65	156	88.34	73	88.56	128	88.13	36	90.63	1300	89.36	454
24, ...	93.76	4850	89.74	662	93.23	4120	88.99	284	89.07	319	88.54	123	88.66	159	88.33	71	88.52	117	88.73	182	90.13	916	89.52	537
25, ...	93.31	4220	89.27	410	800.04	18500	88.92	254	88.90	246	88.46	101	88.53	120	88.32	69	88.48	106	89.29	419	89.84	724	89.72	650
26, ...	92.23	2910	89.25	400	805.13	36300	88.92	254	88.83	219	88.53	120	88.41	88	88.36	77	88.42	91	89.56	559	89.69	632	89.86	737
27, ...	91.20	1820	90.06	868	805.68	38600	89.00	288	88.63	150	88.70	172	88.27	59	88.41	88	88.37	80	89.84	724	89.49	521	89.79	693
28, ...	90.73	1390	92.50	3210	800.32	19300	89.12	341	89.36	454	89.03	301	88.06	27	88.49	109	88.38	82	89.82	711	89.40	474	89.69	632
29, ...	90.27	1090	.....	.....	797.49	11900	89.47	510	89.69	632	89.30	424	87.96	16	88.57	131	88.43	94	89.85	730	89.38	464	89.71	641
30, ...	89.90	762	.....	.....	96.92	8520	89.58	570	89.48	516	89.03	301	87.96	15	88.55	126	88.43	94	89.87	743	89.33	439	89.67	621
31, ...	89.93	781	.....	.....	92.70	3450	.....	.....	89.25	400	.....	.....	87.91	11	88.56	128	.....	.....	89.82	711	.....	.....	89.64	604

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF SHENANGO RIVER AT NEW CASTLE, LAWRENCE COUNTY, PA.

1914.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
DAY.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	789.63	596	793.81	4920	789.00	268	792.97	3780	790.60	1280	788.68	166	788.50	111	788.30	65	788.54	123
2,	89.61	587	92.96	3760	88.96	271	92.66	3400	90.21	973	88.68	166	88.50	111	88.30	65	88.56	128
3,	89.59	575	92.39	3090	88.95	267	92.52	3240	90.15	930	88.68	166	88.48	106	88.30	65	88.64	153
4,	89.70	638	91.27	1890	88.91	250	92.18	2850	90.38	1100	88.78	200	88.46	101	88.30	65	88.64	153
5,	89.84	724	91.05	1680	88.89	242	91.58	2210	90.63	1300	89.16	359	88.46	101	88.28	61	88.61	148
6,	89.94	788	90.73	1390	88.96	267	91.08	1700	91.20	1820	89.16	359	88.44	96	88.20	47	88.50	111
7,	90.26	1010	90.82	1460	89.07	319	91.57	2200	91.09	1710	88.98	290	88.43	94	88.18	44	88.38	82
8,	90.64	1310	90.27	1020	89.10	332	94.19	5500	90.74	1400	88.80	207	88.42	91	88.15	39	88.42	91
9,	91.58	2210	90.19	959	89.07	319	94.76	6410	90.90	1540	88.71	175	88.40	86	88.17	42	88.40	86
10,	91.17	1790	90.12	909	89.15	354	94.65	6240	91.06	1680	88.64	153	88.38	82	88.19	45	88.40	86
11,	91.06	1660	89.99	821	89.22	386	94.49	5960	91.20	1820	88.57	131	88.36	77	88.40	86	88.31	67
12,	90.83	1470	89.84	724	89.29	419	93.01	3830	93.42	4370	88.57	131	88.34	73	88.40	86	88.30	65
13,	90.66	1330	89.40	474	89.35	449	91.98	2630	95.96	8680	88.76	193	88.32	69	88.38	82	88.36	77
14,	90.54	1230	89.17	363	89.93	781	91.42	2040	96.05	8770	88.57	131	88.54	123	88.51	114	88.29	63
15,	90.42	1130	89.01	292	92.00	2660	91.25	1870	94.29	5640	88.46	101	88.66	159	88.50	111	88.30	65
16,	90.36	1080	89.13	345	93.42	4370	92.36	3050	93.04	3870	88.46	101	89.04	306	88.38	82	88.32	69
17,	90.29	1030	89.26	405	93.89	5040	91.79	2430	91.76	2400	88.46	101	89.34	444	88.50	111	88.30	65
18,	90.24	996	89.19	372	94.30	5660	91.15	1770	90.74	1400	88.37	80	89.62	598	88.39	84	88.22	50
19,	90.26	1010	89.16	359	93.28	4180	90.93	1550	90.38	1100	88.41	88	89.38	464	88.40	86	88.21	48
20,	90.33	1060	89.13	346	91.53	2160	90.81	1460	89.93	781	88.42	91	89.20	377	88.40	86	88.19	45
21,	91.20	1820	89.15	354	90.68	1230	90.52	1210	89.60	581	88.42	91	88.98	280	88.36	77	88.14	38
22,	91.25	1870	89.17	363	90.38	1100	90.10	895	89.39	469	88.53	120	88.72	179	88.39	84	88.10	32
23,	91.08	1710	89.10	332	90.46	1160	89.88	749	89.25	400	89.05	310	88.60	140	88.38	82	88.16	41
24,	91.29	1910	89.12	341	90.56	1240	89.69	632	89.21	382	89.01	292	88.52	117	88.54	123	88.14	38
25,	91.39	2010	89.07	319	90.65	1320	90.50	1200	89.10	332	88.82	215	88.48	106	88.58	134	88.10	32
26,	91.52	2150	89.04	306	90.92	1530	93.25	4140	89.04	306	88.70	172	88.44	96	88.91	250	88.06	27
27,	91.55	2180	89.01	292	91.55	2180	93.65	4690	88.96	271	88.65	156	88.39	84	88.78	200	88.12	35
28,	92.74	3500	88.96	271	93.46	4430	92.82	3590	88.91	250	88.59	137	88.34	73	88.66	159	88.07	26
29,	93.35	4290	.....	.....	94.16	5460	92.01	2670	88.86	230	88.58	134	88.32	69	88.73	182	88.03	23
30,	93.65	4690	.....	.....	94.42	5850	91.31	1930	88.82	215	88.54	128	88.30	65	88.64	153	88.03	23
31,	93.76	4850	.....	.....	94.34	5720	.....	.....	88.70	172	.....	.....	88.29	63	88.56	126	.....	.....

Note—Interpolated May 22 to June 27 inclusive.

ESTIMATED MONTHLY DISCHARGE OF SHENANGO RIVER AT NEW CASTLE, LAWRENCE COUNTY, PA.

(Drainage area 797 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1910.					
January,	3350	128	1130	1.418	1.635
February,	5080	424	1150	1.443	1.503
March,	12100	284	3010	3.777	4.354
April,	3180	203	736	0.923	1.030
May,	2910	242	804	1.009	1.163
June,	1050	73	381	0.478	0.534
July,	182	71	103	0.129	0.149
August,	71	32	49	0.061	0.070
September,	350	18	127	0.159	0.178
October,	888	91	260	0.326	0.376
November,	1780	301	1010	1.267	1.414
December,	5360	359	1070	1.343	1.548
The year,	12100	18	819	1.028	13.954
1911.					
January,	6680	405	2700	3.388	3.903
February,	4080	581	1650	2.070	2.156
March,	1760	454	883	1.108	1.278
April,	3020	834	1410	1.769	1.974
May,	1340	45	456	0.572	0.659
June,	1330	47	195	0.245	0.274
July,	621	41	111	0.139	0.160
August,	3170	47	271	0.340	0.392
September,	10800	242	1410	1.769	1.974
October,	5200	469	1800	2.258	2.604
November,	3130	449	1390	1.744	1.945
December,	4590	526	1770	2.221	2.560
The year,	10800	41	1170	1.469	19.882
1912.					
January,	3420	391	938	1.177	1.357
February,	4370	292	1090	1.368	1.476
March,	7020	675	3010	3.777	4.354
April,	6750	490	2550	3.200	3.570
May,	3020	220	715	0.897	1.034
June,	724	114	262	0.329	0.367
July,	883	84	240	0.301	0.347
August,	7020	117	710	0.891	1.027
September,	1890	67	420	0.527	0.588
October,	5200	48	1260	1.581	1.823
November,	973	182	486	0.610	0.681
December,	1900	91	496	0.622	0.717
The year,	7020	67	1010	1.273	17.341
1913.					
January,	8090	762	3650	4.580	5.280
February,	3210	120	517	0.649	0.676
March,	38600	464	5480	6.876	7.927
April,	2900	254	869	1.090	1.216
May,	632	84	261	0.327	0.377
June,	424	65	164	0.206	0.230
July,	981	11	336	0.422	0.486
August,	238	3	96	0.120	0.138
September,	128	80	103	0.129	0.144
October,	743	24	236	0.296	0.341
November,	5840	215	1420	1.782	1.988
December,	737	405	519	0.651	0.750
The year,	38600	3	1140	1.427	19.553
1914.					
January,	4950	575	1720	2.158	2.488
February,	4920	271	1010	1.267	1.319
March,	5850	242	1960	2.447	2.821
April,	6410	632	2860	3.588	4.003
May,	8770	172	1810	2.271	2.618
June,	359	80	171	0.215	0.240
July,	593	63	159	0.200	0.231
August,	250	39	98	0.123	0.142
September,	153	23	70	0.088	0.098

NESHANNOCK CREEK.

DESCRIPTION OF BASIN.

Neshannock Creek, the largest tributary of the Shenango River, drains approximately 245 square miles in Mercer and Lawrence counties. Rising in and passing through numerous extensive swamp areas, in the central and eastern parts of Mercer County, its two branches, Otter and Mill creeks, join near Mercer Borough, and the main stream then follows a general southerly direction for about 23 miles to its mouth at New Castle, Lawrence County, the general outline of the watershed being pear shaped. The upper sections of this stream in Mercer County flow through a deforested, rolling country, in which farming and some bituminous coal mining is carried on. The stream is sluggish in its upper portions, and the basin is covered to a great depth by deposits of glacial drift, but upon entering Lawrence County, it becomes a rapid stream, with numerous falls, flowing through a narrow gorge with high, steep walls of sandstone. From Hope Mills, Mercer County, (elevation, 1107 feet) to New Castle, (elevation, 799 feet), a distance of 20 miles, the rate of fall is about 15 feet per mile. The chief tributaries are Otter, Mill and Little Neshannock creeks. Numerous boroughs, farming and mining villarges lie in this basin, but the stream is not used for domestic water supply, and only to a limited extent for industrial purposes by plants in the vicinity of its mouth.

The mean annual precipitation over this watershed is from 35 to 45 inches.

The discharge has been measured since August 9, 1909, at New Castle, Pennsylvania, near the mouth, and since January 19, 1914, at Eastbrook, about 6 miles above the mouth.

OHIO BASIN—STATION NO. 37.

NESHANNOCK CREEK AT EAST BROOK, PA.

DESCRIPTION OF STATION.

LOCATION—On single span, wood and steel, through-truss, highway bridge at East Brook Station, Lawrence County.

RECORDS AVAILABLE—Discharge measurements and gage heights from January 19, 1914, to September 30, 1914.

DRAINAGE AREA—230 square miles.

GAGE—A standard chain gage is fastened to the upstream side of the bridge. The length of chain from the bottom of the weight to the marker is 32.83 feet. The elevation of zero is arbitrary. Bench Mark No. 1 is a nose or projection on face of left abutment, bottom of eleventh course down from bridge seat, elevation 10.78 feet above gage datum. The gage is read twice daily by F. C. Reynolds.

DISCHARGE MEASUREMENTS—Taken from the upstream side of the bridge. The intial point for soundings is left face of wooden end post on left upstream side.

CHANNEL—The channel is straight for 400 feet above and 200 feet below the station. Both banks are high and not subject to overflow. The bed is composed of rock and gravel.

DISCHARGE MEASUREMENTS OF NESHANNOCK CREEK AT EAST BROOK, LAWRENCE COUNTY, PA.

(Drainage area 230 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.		Remarks.
	1914.		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.		
1	June 22	Bowen & Taylor, ...	97	130	1.31	1.82	170	0.6	measurement.
2	Aug. 24	Hosmer & Brady, ..	72	81	0.93	1.40	75	0.6	measurement.

DAILY MEAN GAGE HEIGHTS OF NESHANNOCK CREEK AT EAST BROOK, LAWRENCE COUNTY, PA.

1914. DAY.	JAN. G. H.	FEB. G. H.	MAR. G. H.	APR. G. H.	MAY. G. H.	JUNE. G. H.	JULY. G. H.	AUG. G. H.	SEPT. G. H.
1,	.....	†2.98	†*2.06	2.70	2.28	1.57	1.22	1.16	1.36
2,	.....	2.66	2.11	3.22	2.22	1.57	1.27	‡1.10	1.34
3,	.....	2.46	2.11	3.16	‡2.22	1.59	1.31	1.05	1.30
4,	.....	2.67	2.06	2.74	2.22	1.91	1.25	1.09	1.48
5,	.....	†2.33	2.06	‡2.53	3.02	2.17	‡1.23	1.09	1.27
6,	.....	2.17	2.06	2.31	2.84	2.13	1.22	1.07	†1.26
7,	.....	2.13	1.98	3.24	2.76	‡1.88	1.19	1.05	1.24
8,	.....	†1.18	†2.06	5.59	2.60	1.63	1.19	1.10	1.16
9,	.....	1.57	1.96	4.78	2.40	1.57	1.21	†1.34	1.14
10,	.....	1.86	1.96	3.22	‡2.39	1.53	1.26	1.28	1.18
11,	.....	1.86	1.96	2.92	2.38	1.51	1.31	1.32	1.16
12,	.....	1.56	1.96	‡2.62	5.72	1.43	‡1.27	1.42	1.17
12,	.....	1.55	2.04	2.32	5.96	1.45	1.23	1.39	†1.18
14,	.....	1.66	2.70	2.30	3.60	‡1.44	1.32	1.34	1.19
15,	.....	‡1.71	†3.46	3.01	3.23	1.43	1.69	1.29	1.31
16,	.....	1.76	4.24	2.83	3.07	1.42	1.73	‡1.30	1.13
17,	.....	1.84	4.32	3.07	‡2.62	‡1.47	1.63	1.30	1.11
18,	.....	1.94	4.67	3.09	2.16	‡1.52	1.45	1.22	1.12
19,	2.10	1.87	4.11	‡3.02	2.04	‡1.57	‡1.33	1.18	1.14
20,	2.17	1.90	2.94	2.94	2.00	1.62	1.20	1.18	†1.20
21,	3.00	1.84	2.27	2.48	1.92	‡1.67	1.24	1.20	1.08
22,	2.56	‡1.86	‡2.18	2.22	1.88	1.81	1.23	1.22	1.04
23,	2.34	1.87	2.08	2.15	1.84	1.65	1.22	‡1.32	1.00
24,	2.42	1.84	2.02	2.02	‡1.80	1.49	1.21	1.42	1.02
25,	†2.80	1.77	2.11	1.98	1.76	1.45	1.21	1.54	1.04
26,	2.98	1.78	2.46	†3.24	1.66	1.44	‡1.22	1.46	1.01
27,	3.32	1.88	2.90	3.02	1.68	1.42	1.23	1.34	‡1.02
28,	4.26	1.90	5.04	2.78	1.96	†1.50	1.24	1.32	1.02
29,	4.31	.....	†3.96	2.66	1.77	1.34	1.21	1.54	1.02
30,	3.74	.....	2.66	2.42	1.70	1.21	1.22	†1.56	0.96
31,	3.26	.....	2.88	.....	.....	.....	1.17	1.46	.....

*Creek frozen Mar. 1-15 inclusive. †Estimated. ‡Interpolated.

MAHONING RIVER.

DESCRIPTION OF BASIN.

The Mahoning River, the largest tributary of the Beaver River, draining an area of approximately 1,062 square miles, rises in Columbiana and Stark counties, Ohio, and flows in a northeast direction a considerable distance to north of Warren, Trumbull County, Ohio, where the river turns and flows southeast, crossing the Pennsylvania-Ohio state line into Lawrence County, Pa., at a point about 7 miles south of the northwest corner of Lawrence County. From this point the river continues in a general southeasterly direction for a distance of approximately 10½ miles to its confluence with the Shenango River, about 3 miles below New Castle, Pa., to form the Beaver River. The Mahoning River in its last 30

miles has a moderate slope of about 3 feet per mile, and carries a considerable volume of water. The average width of the river in Pennsylvania is 300 feet, the valley being skirted by low hills, the stream flowing between low, cultivated meadows and bottom lands. The watershed is well populated, the largest towns in Ohio being Warren, Girard and Youngstown, while Mahoningtown is the largest town in Pennsylvania. In Ohio there is considerable waterpower developed on this stream, but little or none in Pennsylvania. It is proposed by the Lake Erie and Ohio River Ship Canal to slack water up the river to Niles, Ohio, approximately 28 miles above its mouth.

The mean annual precipitation over this watershed is approximately between 35 and 40 inches.

The discharge of this river was measured at Youngstown, Ohio, from May 23, 1903, to July 23, 1906, and since August 12, 1914, at Lawrence Junction, Lawrence County, Pa.

OHIO BASIN—STATION NO. 38.

MAHONING RIVER AT LAWRENCE JUNCTION, PA.

DESCRIPTION OF STATION.

LOCATION—On Borough Line Bridge over river which is the first highway bridge above the mouth of Mahoning and about ½ mile above same.

RECORDS AVAILABLE—Discharge measurements from March 10, 1914, and daily discharge from August 12, 1914, to September 30, 1914.

DRAINAGE AREA—1,070 square miles.

GAGE—A chain gage is attached to the downstream side of the bridge. The elevation of zero is 760 feet, New Castle City datum. Bench Mark No. 1 is square cut in bridge seat, south side, east end of bridge next to Pennsylvania Railroad or on the left hand side looking downstream, elevation 776.179 feet, New Castle City datum. The gage is read by C. O. Brest.

DISCHARGE MEASUREMENTS—Taken from the downstream side of the bridge. The initial point for soundings is extreme east end of handrail.

CHANNEL—The channel above and below the station is straight for ¼ mile. Both banks are subject to overflow at gage height 11.0 feet. The bed is composed of sand and gravel.

DISCHARGE MEASUREMENTS OF MAHONING RIVER AT LAWRENCE JUNCTION, LAWRENCE COUNTY, PA.

(Drainage area 1,070 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914.		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
1	Mar. 10	Munn,	206	520	0.74	763.9	383	
2	Mar. 17	Ferris,	274	2165	4.31	770.45	9341	
3	Mar. 18	Haslam,	274	1714	2.97	768.80	5094	
4	Mar. 19	Haslam,	246	1086	2.04	766.42	2221	
5	Mar. 20	Ferris,	237	962	1.68	765.9	1617	
6	May 14	Ferris,	†469	‡3031	*4.97	772.83	*15074	*Overflow.
7	Aug. 19	Brown,	180	188	0.42	762.21	79	Wading below station.
8	Sept. 23	Munn,	176	179	0.41	762.16	73	Wading below station.
9	Sept. 28	Munn,	172	167	0.36	762.09	61	Wading below station.

Note:—All widths, areas, mean velocities referred to regular section.
*Overflow measured and included. Overflow discharge 231.55 sec. ft.
‡Overflow area 216.63 sq. ft. Total area 3031.06 sq. ft. Channel 2814.43 sq. ft.
†Includes width of overflow=195 ft.

DISCHARGE TABLE FOR MAHONING RIVER AT LAWRENCE JUNCTION, LAWRENCE COUNTY, FROM AUGUST 12, 1914.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
761.00	0	.10	448	.20	3059	.30	8963	.40	16526
.10	4.0	.20	486	.30	3187	.40	9206	.50	17[illegible]0
.20	8.5	.30	528	.40	3319	.50	9450	.60	17014
.30	13	.40	572	.50	3455	.60	9694	.70	17258
.40	18	.50	620	.60	3594	.70	9938	.80	17502
.50	23	.60	669	.70	3735	.80	10182	.90	17746
.60	29	.70	722	.80	3879	.90	10424	774.00	17990
.70	35	.80	780	.90	4026	771.00	10670	.10	18234
.80	42	.90	842	768.00	4175	.10	10914	.20	18478
.90	49.5	765.00	905	.10	4328	.20	11158	.30	18722
762.00	57	.10	972	.20	4484	.30	11402	.40	18966
.10	65	.20	1045	.30	4645	.40	11646	.50	19210
.20	75	.30	1118	.40	4820	.50	11890	.60	19554
.30	85	.40	1194	.50	4998	.60	12134	.70	19698
.40	95	.50	1274	.60	5180	.70	12378	.80	19942
.50	106	.60	1359	.70	5365	.80	12622	.90	20186
.60	118	.70	1446	.80	5554	.90	12866	775.00	20430
.70	131	.80	1536	.90	5746	772.00	13110	.10	20674
.80	144	.90	1632	769.00	5943	.10	13354	.20	20918
.90	159	766.00	1730	.10	6146	.20	13598	.30	21162
763.00	175	.10	1830	.20	6356	.30	13842	.40	21406
.10	192	.20	1930	.30	6576	.40	14086	.50	21650
.20	210	.30	2031	.40	6808	.50	14330	.60	21894
.30	229	.40	2134	.50	7054	.60	14574	.70	22138
.40	250	.50	2240	.60	7289	.70	14818	.80	22382
.50	273	.60	2350	.70	7505	.80	15063	.90	22626
.60	297	.70	2460	.80	7745	.90	15308	776.00	22870
.70	323	.80	2574	.90	7987	773.00	15550		
.80	351	.90	2690	770.00	8230	.10	15794		
.90	381	767.00	2810	.10	8474	.20	16038		
764.00	414	.10	2934	.20	8718	.30	16282		

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF MAHONING RIVER AT LAWRENCE JUNCTION, LAWRENCE COUNTY, PA.

1914. DAY.	AUGUST. G. H.	AUGUST. Dis.	SEPTEMBER. G. H.	SEPTEMBER. Dis.
1,	.....	.....	763.62	120
2,	.....	.....	763.49	270
3,	.....	.....	763.74	334
4,	.....	.....	764.22	494
5,	.....	.....	763.42	264
6,	.....	.....	763.05	184
7,	.....	.....	762.64	124
8,	.....	.....	762.29	84
9,	.....	.....	762.32	86
10,	.....	.....	763.44	99
11,	.....	.....	762.35	90
12,	761.94	52	762.25	80
13,	.....	.....	762.16	71
14,	.....	.....	762.24	79
15,	.....	.....	762.15	70
16,	.....	.....	762.20	75
17,	.....	.....	762.20	75
18,	.....	.....	762.27	82
19,	762.25	80	762.13	74
20,	762.08	64	762.05	61
21,	762.08	64	761.85	46
22,	762.02	59	762.15	70
23,	762.74	126	762.15	70
24,	762.88	156	762.20	75
25,	762.85	151	762.00	58
26,	763.04	181	762.00	58
27,	763.06	189	762.00	58
28,	762.63	128	762.05	61
29,	763.00	175	761.96	55
30,	762.47	103	761.94	52
31,	762.44	99	.....	.....

ESTIMATED MONTHLY DISCHARGE OF MAHONING RIVER AT LAWRENCE JUNCTION, LAWRENCE COUNTY, PA.

(Drainage area 1,070 square miles).

MONTH.	Discharge in Second-feet. Maximum	Minimum	Mean.	Run-off. Second-feet per square mile.	Depth in inches.
1914. September, ...	494	46	114	0.107	0.120

SLIPPERY ROCK CREEK.

DESCRIPTION OF BASIN.

Slippery Rock Creek, the largest tributary of Connoquenessing Creek, drains approximately 403 square miles in Butler, Mercer and Lawrence counties. Several branches rise in the north central portion of Butler County, and come together to form the main stream near Branchton, Butler county. The main stream flows in a general southwesterly direction following a tortuous course, its total length being approximately 43 miles. In the central section of the stream the valleys are broad and largely cultivated, as are the hills, the current being sluggish and flowing between gently sloping banks, with wide plains bordering it on either side. After the stream enters Lawrence County, the broad valleys contract to a narrow gorge, and the low sloping banks are replaced by high cliffs of massive sandstone, and the hitherto gently flowing streams become a rapid torrent.

The elevation of the stream at its source is approximately 1400 feet above mean sea level and, at Kiesters, 14 miles below, the elevation is 1150 feet, producing a slope of 18 feet per mile. From Kiesters to Kennedy's Mill, elevation 1,040 feet, the stream flows through a gently sloping valley for a distance of 17 miles, having a slope of approximately 6 feet per mile. After leaving Kennedy's Mill, the creek enters the gorge which continues almost to its mouth, (elevation 580 feet) a distance of approximately 12 miles, with a slope of approximately 39 feet per mile.

The only tributary of any importance is Muddy Creek, which enters it from the east in Butler County, although there are many small tributaries entering it in Lawrence, Butler and Mercer counties.

The domestic water supply for Ellwood City and vicinity is obtained from Slippery Rock Creek at its mouth. The water power of the creek is used by numerous grist mills.

The mean annual precipitation over the headwaters of the stream is from 40 to 45 inches, and over the lower reaches from 35 to 40 inches.

The discharge has been measured since January 1, 1912, near Wurtemberg, approximately 2 miles above the mouth.

OHIO BASIN—STATION NO. 39.

SLIPPERY ROCK CREEK AT WURTEMBERG, PA.

DESCRIPTION OF STATION.

LOCATION—On the highway bridge crossing Slippery Rock Creek at the north end of Wurtemberg, Lawrence County.

RECORDS AVAILABLE—Discharge complete from January 1, 1912, to September 30, 1914.

DRAINAGE AREA—400 square miles.

GAGE—A chain gage is attached to the bridge. The length of chain from the bottom of the weight to the marker is 35.96 feet. The elevation of zero is 817.63 feet above sea level. Bench Mark No. 1 is U. S. G. S. B. M. on top of upstream right wingwall near end of abutment, aluminum tablet stamped "851 ADJ 1903," elevation 850.231 feet above sea level. The gage is read twice daily by Jacob Boots.

DISCHARGE MEASUREMENTS—Taken from the upstream side of the bridge. The initial point for soundings is west end of the north guard rail.

CHANNEL—The channel is straight and uniform for one-half mile above and six hundred feet below the station. Both banks are abrupt. The bed is composed of gravel.

DISCHARGE MEASUREMENTS OF SLIPPERY ROCK CREEK AT WURTEMBERG, LAWRENCE COUNTY, PA.

(Drainage area 400 square miles).

No.	Date.	Hydrographer.	Width.	Area of section.	Mean velocity.	Gage height.	Discharge.	Remarks.
	1914.		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
20	June 23	Bowen & Taylor, ...	221	288	0.97	2.73	278	0.6 measurement.
21	Aug. 24	Hosmer & Brady, ...	55	79	0.94	2.15	74	0.6 measurement.

DISCHARGE TABLE FOR SLIPPERY ROCK CREEK AT WURTEMBERG, LAWRENCE COUNTY, FROM JAN. 1, 1912.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
2.00	20	.10	610	.20	1700	.30	3350	.40	5730
.10	30	.20	690	.30	1820	.40	3580	.50	5980
.20	50	.30	770	.40	1950	.50	3720	.60	6240
.30	80	.40	860	.50	2090	.60	3910	.70	6510
.40	120	.50	950	.60	2220	.70	4120	.80	6780
.50	190	.60	1040	.70	2360	.80	4330	.90	7050
.60	250	.70	1140	.80	2510	.90	4550	7.00	7330
.70	320	.80	1240	.90	2670	6.00	4780		
.80	390	.90	1350	5.00	2830	.10	5010		
.90	460	4.00	1460	.10	3000	.20	5250		
3.00	530	.10	1580	.20	3170	.30	5490		

DAILY MEAN GAGE HEIGHTS AND DISCHARGES OF SLIPPERY ROCK CREEK AT WURTEMBERG, LAWRENCE COUNTY, PA.

1914. DAY.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.	
	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.	G H	Dis.
1,	2.93	481	5.20	3170	.....	300	4.10	1580	3.47	923	2.46	166	2.31	85	2.04	24	2.22	56
2,	2.97	509	4.46	2080	.....	300	4.43	1990	3.27	746	2.44	154	2.25	65	2.07	27	2.46	166
3,	2.91	467	4.00	1460	.....	300	4.56	2160	3.13	634	2.40	130	2.29	77	2.10	30	2.41	136
4,	2.97	509	4.04	1510	.....	300	4.13	1620	3.04	562	2.96	502	2.24	62	2.04	24	2.50	190
5,	2.99	523	3.96	1420	.....	300	3.75	1190	3.65	1090	3.46	914	2.19	48	2.16	42	2.40	130
6,	3.06	578	3.80	1040	.....	300	3.58	1020	4.34	1870	3.06	578	2.16	42	2.08	28	2.27	71
7,	3.21	698	3.54	986	.....	300	3.85	1300	3.79	1230	2.69	313	2.18	46	2.06	26	2.15	40
8,	3.25	730	3.39	851	.....	300	5.58	3730	3.47	923	2.50	190	2.17	44	2.05	25	2.12	34
9,	3.45	905	2.86	432	.....	300	5.17	3120	3.88	1330	2.44	154	2.21	53	2.05	25	2.16	42
10,	3.87	1320	3.16	658	.....	300	4.51	2090	3.64	1080	2.42	142	2.09	29	2.08	28	2.10	30
11,	3.99	1450	*	360	.....	300	4.17	1660	3.41	869	2.34	100	2.08	28	2.18	46	2.10	30
12,	3.83	1270	.....	360	.....	300	4.30	1820	5.63	3970	2.30	80	2.07	27	2.20	50	2.12	34
13,	3.57	1010	.....	360	.....	300	3.96	1420	6.26	5370	2.30	80	2.11	32	2.16	42	2.12	34
14,	3.80	1240	.....	360	.....	300	3.59	1080	4.95	2720	2.28	74	2.45	160	2.20	50	2.08	26
15,	3.68	1120	.....	360	.....	300	3.59	1080	4.17	1660	2.32	90	2.71	327	2.18	46	2.09	29
16,	3.55	995	.....	360	5.48	3680	4.88	2560	3.74	1180	2.24	62	2.51	196	2.10	30	2.06	26
17,	3.53	977	.....	360	5.40	3530	4.63	2260	3.45	905	2.24	62	2.41	136	2.12	34	2.12	34
18,	3.53	977	.....	360	4.86	2610	4.17	1660	3.21	698	2.20	50	2.41	136	2.07	27	2.04	24
19,	3.43	887	.....	360	4.12	1600	3.98	1390	3.11	618	2.24	62	2.29	77	2.06	26	2.09	29
20,	3.41	869	.....	360	3.70	1140	4.25	1760	3.01	538	2.29	77	2.23	56	2.04	24	2.04	24
21,	4.27	1780	.....	360	3.39	851	4.10	1580	2.92	474	2.28	74	2.13	36	2.16	42	2.04	24
22,	4.39	1940	.....	360	3.36	824	3.74	1190	2.87	439	2.50	190	2.13	36	2.16	42	2.02	22
23,	4.25	1750	.....	360	3.20	690	3.55	995	2.89	463	2.75	355	2.13	36	2.11	32	2.00	20
24,	4.27	1780	.....	360	3.10	610	3.35	815	2.83	411	2.59	244	2.12	34	2.17	44	2.04	24
25,	4.73	2400	.....	360	3.28	754	4.02	1480	2.71	327	2.42	142	2.11	32	2.18	46	2.10	30
26,	4.43	1990	.....	360	3.68	1120	6.47	5900	2.65	285	2.33	96	2.09	29	2.14	38	2.06	26
27,	4.13	1620	.....	360	3.94	1390	5.59	3890	2.61	257	2.25	65	2.09	29	2.15	40	2.04	24
28,	4.98	2800	.....	360	5.68	4050	4.47	2040	2.71	327	2.45	160	2.09	29	2.14	38	2.04	24
29,	5.53	3780	.....	.....	5.46	3640	4.05	1520	2.71	327	2.38	120	2.07	27	2.25	65	2.10	30
30,	5.57	3850	.....	.....	4.82	2540	3.75	1190	2.59	244	2.32	90	2.10	30	2.29	77	2.06	26
31,	5.22	3210	.....	.....	4.62	2250	.....	.....	2.54	214	.....	.....	2.06	26	2.22	56	.....	.....

*Creek frozen Feb. 11 to Mar. 15 inclusive, and discharge estimated from climatological records.

ESTIMATED MONTHLY DISCHARGE OF SLIPPERY ROCK CREEK AT WURTEMBERG, LAWRENCE COUNTY, PA.

(Drainage area 400 square miles).

MONTH.	Discharge in Second-feet.			Run-off.	
	Maximum	Minimum	Mean.	Second-feet per square mile.	Depth in inches.
1914.					
January,	3850	467	1420	3.575	4.122
February,	3170	.....	716	1.790	1.864
March,	4050	.....	1150	2.875	3.314
April,	5900	815	1900	4.750	5.300
May,	5370	214	1050	2.625	3.026
June,	914	50	184	0.460	0.513
July,	327	26	67	0.168	0.194
August,	77	24	38	0.095	0.110
September,	190	20	48	0.120	0.134

Creek frozen Feb. 11 to Mar. 15 inclusive, and discharge estimated from climatological records.

MISCELLANEOUS DISCHARGE MEASUREMENTS OF PENNSYLVANIA STREAMS MADE FROM JANUARY 1, TO SEPTEMBER 30, 1914.

Stream.	Location.	Date.	Drainage area above point.	Gage height.	Total discharge.	Discharge per square mile tributary drainage area.	Remarks.
			Sq. Mi.	Feet.	Sec. Ft.	Sec. Ft.	
Beaver River, ...	Beaver Falls, Beaver County,....	March, 31, 1914,..	3,010	*7.90	17,260	5.734	*College dam chain gage.
Beaver River, ...	Beaver Falls, Beaver County,....	April 1, 1914,..	3,010	*7.06	13,180	4.362	*College dam chain gage.
Beaver River, ...	Beaver Falls, Beaver County,....	Sept. 28, 1914,..	3,010	*3.08	104	0.035	Measurement from Fallston bridge. *College dam gage.
Beaver River, ...	West Elwood Jct., Beaver Co.,	Sept. 28, 1914,..	2,980	*3.15	111	0.037	*College dam gage.
Connoquenessing Creek, ..	Elwood City, Lawrence County,	Sept. 28, 1914,..	822	.....	53	0.064	Measurement at Pa. Power Co. plant.
Shohola Creek, ...	Lords Valley, Pike County, ...	June 3, 1914,..	32	4.72	23	0.719	Wading measurement 100 feet above gaging station.
Shohola Creek, ...	Lords Valley, Pike County, ...	June 25, 1914,..	32	4.60	15	0.469	Wading measurement 100 feet above gaging station.
Shohola Creek, ...	Lords Valley, Pike County, ...	Sept. 23, 1914,..	32	4.17	4	0.125	Measurement at gaging station.

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